Exhibit 73

EXHIBIT 1

United States District Court

Southern District of New York

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IN RE GLOBAL BROKERAGE, INC. f/k/a FXCM INC. SECURITIES LITIGATION	:	Case No. 1:17-cv-00916-RA-BCM
	x	

EXPERT REPORT OF TERRENCE HENDERSHOTT, PH.D.

June 12, 2020

Table of Contents

I. Qualifications and Compensation 1

II. Assignment and Summary of Allegations 2

III. Summary of Opinions 4

IV. Dr. Werner Fails to Demonstrate that the FXCM Notes Traded in an Efficient Market Throughout the Putative Notes Class Period 6

A. Market Efficiency from the Perspective of a Financial Economist 6

B. Market Efficiency of the Corporate Bond Markets 9

C. Dr. Werner Has No Reliable Basis to Conclude that the FXCM Notes Traded in an Efficient Market and Ignores Evidence That Would Be Inconsistent With Market Efficiency Under His Own Approach 14

D. Dr. Werner Also Makes Numerous Methodological Errors that Render His Event Study Analyses Unreliable 42

V. Dr. Werner Has Failed to Propose a Class-wide Damages Methodology That Is Tied to Plaintiffs' Theory of Liability 43

A. Dr. Werner Fails to Explain How His Generic Damages Approach Can Disentangle the Effect of the Allegedly Corrective Information Regarding FXCM's "No Dealing Desk" from Regulatory and Other Collateral Consequences in Order to Measure Inflation 44

B. Dr. Werner Has Not Demonstrated that an Event Study Based on the FXCM Security Price Movements on February 7, 2017 Could Provide a Reliable Measure of the Value Impact of Information Revealed on that Day 49

C. Dr. Werner's Proposed Methodology Fails to Account for Potential Changing Inflation Across the Putative Class Period 51

I. Qualifications and Compensation

1. I am a Professor and the Willis H. Booth Chair in Banking and Finance at the Haas School of Business at the University of California Berkeley. **Appendix A** contains my CV and a list of my deposition and trial testimony over the last four years.

2. My expertise and research focuses on market microstructure, which includes how information is incorporated into security prices and the interaction between trading and prices of various securities and financial instruments. Specifically, I have conducted research regarding how the prices of stocks, corporate bonds, and other over-the-counter and exchange-traded products incorporate information. In addition, I have studied high-frequency trading, electronic communications networks and exchange design, regulation of financial markets, management of information systems, and the role of information technology in financial markets. My research has also been on market efficiency and related topics in the corporate bond markets, including market liquidity and how market prices discover and incorporate new information.

3. I have published numerous articles on the structure, design, and regulation of financial markets and how market participants—such as market makers, high-frequency traders, and institutional investors—affect price discovery and the liquidity of different financial markets in leading economics and finance journals, including the *Journal of Finance*, *Journal of Financial Economics*, *Review of Financial Studies,* and *Review of Economic Studies*. Additionally, I received the New York Stock Exchange Euronext Award from the Western Finance Association and the Nasdaq Award from the Financial Management Association for my research on equity trading and market microstructure.

4. I teach undergraduate and graduate-level courses on business analytics, information technology strategy, and high-frequency finance at the Haas School of Business. I have served on the editorial boards of leading operations management and finance journals, including *Management Science*, *Journal of Financial Markets*, and *Decision Support Systems*.

5. In addition to my academic work, I served as the visiting economist at the New York Stock Exchange from 2005 to 2006, as a member of the Nasdaq Economic Advisory Board from 2004 to 2007, and as chair of the Nasdaq Economic Advisory Board in 2007. I served as a member of the Commodity Futures Trading Commission's ("CFTC") subcommittee of the

Technology Advisory Committee ("TAC") focusing on High-Frequency Trading and the Financial Industry Regulatory Authority's ("FINRA") market surveillance advisory group. I have also consulted on issues related to market efficiency for a number of financial markets, high-frequency trading firms, and investment firms.

6. I am being compensated for my time and services on an hourly basis at my regular rate of $1,125 per hour. I was assisted in this matter by staff of Cornerstone Research, who worked under my direction. I receive compensation from Cornerstone Research based on its collected staff billings for its support of me in this matter. Neither my compensation in this matter, nor my compensation from Cornerstone Research, is in any way contingent or based on the content of my opinions or the outcome of this or any other matter.

II. Assignment and Summary of Allegations

7. I have been retained by Counsel for Global Brokerage, Inc. f/k/a FXCM Inc. ("FXCM" or the "Company"), Dror Niv and William Ahdout (collectively with FXCM, the "Defendants") to review the Corrected Expert Report of Adam Werner, Ph.D., dated January 10, 2020 (the "Werner Report") and to assess the economic arguments put forth by Dr. Werner. Specifically, I have been asked to evaluate whether Dr. Werner's analysis reliably demonstrates that the FXCM 2.25% Convertible Senior Notes due 2018 (the "FXCM Notes") traded in an efficient market between June 24, 2014 and February 6, 2017 (the "Putative Notes Class Period"). I have also been asked to evaluate whether the purported damages methodology described by Dr. Werner can be used to calculate damages in this matter for both FXCM's common stock and the FXCM Notes on a class-wide basis in a manner consistent with Plaintiffs' theory of liability. A list of the documents and data I have considered in forming my opinions is attached hereto as **Appendix B**.

8. I understand that Plaintiffs' allegations in this case focus on FXCM's public statements about its "No Dealing Desk" ("NDD") model and its business arrangements with a high-

frequency trading firm, Effex Capital, LLC ("Effex").[1] Specifically, Plaintiffs allege that "[f]or years, FXCM claimed that the Company's [NDD] platform provided its customers with retail foreign exchange ('forex') trading that was free of conflicts of interest. …."[2] Plaintiffs further allege that Effex operated "as a functional subsidiary" of FXCM and that FXCM entered into a sham "services agreement" whereby it gave Effex distinct trading advantages over other market makers but retained 70 percent of Effex's trading profits (*i.e.*, nearly $80 million through 2014), disguised as "order flow" payments, all while continuing to make misstatements about the NDD platform as being conflict-free in its SEC filings.[3] Plaintiffs allege that:

> Eventually, both the U.S. Commodity Futures Trading Commission ('CFTC') and National Futures Association ('NFA') brought regulatory actions against FXCM based on the Company's undisclosed relationship with Effex…. On February 6, 2017, the CFTC announced that it had banned the Company from operating in the U.S… The same day, the NFA also issued an order against FXCM…. and issued an order terminating the NFA memberships of FXCM and the individual defendants… In response to the CFTC and NFA orders, the price of FXCM's stock and the FXCM Notes dropped sharply, damaging investors.[4]

9. Plaintiffs define the Class as:

> All persons and/or entities that purchased or otherwise acquired publicly traded Global Brokerage, Inc., f/k/a FXCM Inc. ("FXCM") securities, including FXCM 2.25% Convertible Senior Notes due 2018 and Class A common stock, during the period March 15, 2012 through February 6, 2017, both dates inclusive.[5]

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[1] Plaintiffs define the Putative Class Period as March 15, 2012 to February 6, 2017, both dates inclusive. *See*, Plaintiffs' Third Amended Consolidated Securities Class Action Complaint, *In re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*, April 6, 2018 ("Complaint"), ¶ 1.

[2] Memorandum of Law in Support of Amended Motion for Class Certification and Appointment of Class Representatives and Class Counsel, *In re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*, April 9, 2020 ("Plaintiffs Motion for Class Certification"), p. 3.

[3] Plaintiffs Motion for Class Certification, p. 4.

[4] Plaintiffs Motion for Class Certification, pp. 4–5.

[5] "Excluded from the Class are: (i) Defendants; (ii) current and former officers, employees, consultants and directors of FXCM and FXCM Holdings, LLC; (iii) siblings, parents, children, spouses, and household members of any person excluded under (i) and (ii); (iv) any entities affiliated with, controlled by, or more than 5% owned by, any person excluded under (i) through (iii); and (v) the legal representatives, heirs, successors or assigns of any person excluded under (i) through (iv)." *See*, Plaintiffs Motion for Class Certification, p. 1.

III. Summary of Opinions

10. Below I provide a summary of my opinions, the bases for which—including detailed explanations of my analyses, reasoning, and support—are outlined in the sections below.

11. First, as explained further in **Section IV**, the Werner Report does not provide reliable evidence showing that the FXCM Notes traded in an efficient market throughout the Putative Notes Class Period. Dr. Werner fails to account for the fact that the market for the FXCM Notes was decentralized, more opaque, and less liquid than would generally be in the case of stock markets.

12. Dr. Werner's market efficiency analysis for the FXCM Notes market suffers from serious conceptual and methodological flaws and deficiencies that render his opinion unreliable. Dr. Werner's assessment of trading volume and analyst coverage, two of the *Cammer* Factors, focuses solely on *average* measures across the entire two-and-a-half-year Putative Notes Class Period. However, during this time FXCM experienced dramatic changes to its business and financial condition. Dr. Werner's analysis fails to account for the fact that in the many months leading up to the alleged corrective disclosure, the FXCM Notes traded sparsely and had limited analyst coverage. Further, the evidence provided by Dr. Werner on the other *Cammer* and *Krogman* Factors is also flawed, deficient, and sometimes absent.

13. More importantly, Dr. Werner's assessment of *Cammer* Factor No. 5 (price reaction to new information) is deeply flawed and unreliable. Dr. Werner's analysis is biased, unscientific, and internally inconsistent. Dr. Werner purports to rely on a "news no-news" analysis to conclude that the market for FXCM's common stock was efficient over the entire Putative Class Period. However, he performed no such test for the FXCM Notes. Instead, he concludes, based on only two dates—both of which represent catastrophic events for the Company—that the FXCM Notes traded in an efficient market *throughout* the two-and-a-half-year Putative Notes Class Period. Furthermore, the application of Dr. Werner's "news no-news" test to the FXCM Notes does not support his finding of market efficiency. Indeed, the FXCM Notes did not trade at all on several so-called "news" days (*i.e.*, days when the Company filed an SEC form 8-K) when FXCM's common stock price reacted in a statistically significant manner. Dr. Werner

provides no justification for why the Notes would not be expected to trade on these days if the market for the Notes was efficient.

14. **Section V** addresses Plaintiffs' claim that damages for class-wide claims related to FXCM common stock and the FXCM Notes can be readily calculated using an "event study methodology."[6] However, Dr. Werner fails to show that the generic damages approach described in his report, including his generic reference to an event study, could be used to calculate damages in a manner consistent with Plaintiffs' theory of liability.

15. Specifically, information about regulatory ramifications and other collateral consequences that arose from the alleged corrective disclosure (*e.g.*, FXCM's immediate exit of its U.S. business) was also released on February 6, 2017. From an economics perspective, the price impact of such collateral consequences may not reflect the removal of alleged price inflation (*i.e.,* how price during the Putative Class Period would have changed had investors known about the alleged business arrangements with Effex that discontinued in 2014), and one cannot simply rely on an event study, such as the one employed by Dr. Werner, to disentangle the impact of such information. Dr. Werner fails to explain how the generic damages approach he advocates can be used to measure price inflation attributable to the alleged misrepresentations and omissions rather than the impact of collateral consequences. Further, given the various deficiencies and flaws in Dr. Werner's market efficiency analysis, he fails to demonstrate that the bond price decline on February 7, 2017 can be used as a reliable measure of the value impact of the alleged corrective disclosure from the prior day. Finally, Dr. Werner does not explain how his methodology can be used to measure inflation throughout the Putative Class Period given the drastic change of the Company's financial conditions and the fact pattern in this case.

[6] Plaintiffs Motion for Class Certification, p. 23.

IV. Dr. Werner Fails to Demonstrate that the FXCM Notes Traded in an Efficient Market Throughout the Putative Notes Class Period

16. I understand from counsel that Plaintiffs must prove that the market for the FXCM Notes was efficient throughout the Putative Notes Class Period.

17. Below I discuss market efficiency from the perspective of financial economists, explain important features of the corporate bond market, and evaluate Dr. Werner's purported tests of market efficiency for the FXCM Notes.

A. Market Efficiency from the Perspective of a Financial Economist

18. In an efficient market, "prices always 'fully reflect' available information."[7] If investors execute trades in a security that trades in an efficient market, it can be presumed that the price at which the investors transact fully reflects all publicly-available information.

19. Early researchers on market efficiency developed what is referred to as the Efficient Market Hypothesis ("EMH"). Professor Eugene Fama of the University of Chicago, a principal developer of EMH, who was awarded the 2013 Nobel Prize in Economics, stated that "[a]n efficient capital market is a market that is efficient in processing information. The prices of securities observed at any time are based on 'correct' evaluation of all information available at that time. In an efficient market, prices 'fully reflect' available information."[8]

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[7] Fama, Eugene F. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work." *The Journal of Finance* 25 (2): 383–417 at p. 383.

[8] Fama, Eugene F. 1976. *Foundations of Finance: Portfolio Decisions and Securities Prices*. Basic Books: New York, p. 133. Financial economists recognize market efficiency in three different forms: weak-form efficiency, semi-strong form efficiency, and strong-form efficiency. *See,* Fama, Eugene F. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work." *The Journal of Finance* 25 (2): 383–417 at p. 388. In a weak-form efficient market, investors can use historical information regarding a security's price, volume, and returns to predict future security price movements. A semi-strong form efficient market indicates that historical prices and volume cannot be used to predict future price movements (as in weak-form efficient markets) and also that security prices quickly and fully adjust to reflect new, value-relevant public information. In a strong-form efficient market, security prices reflect not only the public information, as in semi-strong form efficient markets, but also any non-public information possessed by "any investor or groups (*e.g.*, managements of mutual funds) [that] have monopolistic

20. The underlying rationale for why prices in an efficient market fully reflect all publicly available information is that the presence of competition amongst investors and the ability to trade on public information would quickly eliminate opportunities to profit on such information. Specifically, sophisticated investors can trade by exploiting "mispricing" of a security relative to similar financial instruments on different markets or in different forms, which is called "arbitrage."[9] By searching for and trading on mispricing (e.g., buying securities that are priced too low or selling securities that are priced too high given available public information), arbitrageurs ensure that public information is rapidly and fully reflected in the prices of securities.

21. Researchers have investigated the question of whether markets are efficient in various financial markets over the past 50 years. A large and growing body of academic research has documented evidence that even in an active and competitive security market, various frictions can result in the price of a security moving in a manner that is inconsistent with market efficiency. Specifically, the arbitrage activities described above are not without cost or risk in the real world. Capital constraints, transaction costs, and other various risks can dramatically affect arbitrageurs' incentives and effectiveness in ensuring that new information is impounded into securities prices in an efficient manner. As Professor Fama stated in one of his seminal works:

> [T]hough transaction costs, information that is not freely available to all investors, and disagreement among investors about the implications of given information are not necessarily sources of market inefficiency, they are potential sources. And all three exist to some extent in real world markets. Measuring their effects on the

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access to any information relevant for the formation of prices." I focus my discussion to the semi-strong form of market efficiency, which I understand is the most relevant to examine in this setting. *See*, Fama, Eugene F. 1991. "Efficient Capital Markets: II," *The Journal of Finance,* 46 (5): 1575–1617 at p. 1576.

[9] *See*, Hull, John C. 2009. *Options, Futures and Other Derivatives*. Upper Saddle River, NJ: Prentice Hall, p. 818.

process of price formation is, of course, the major goal of empirical work in this area.[10]

22. The existence of such frictions is commonly referred to as the "limits to arbitrage," and academic literature has examined and discussed such constraints.[11] Empirical studies have investigated market frictions that impede prices from reflecting value-relevant information and have documented departures from efficiency for a wide variety of securities at various times. Examples of such frictions include, among others, funding constraints,[12] constraints on trading (*e.g.*, short selling constraints),[13] constraints on investor attention,[14] and frictions and costs due to the processing of information.[15]

23. Indeed, there is well-documented evidence that even securities that are well covered, listed on exchanges, and traded in relatively liquid markets may not always be informationally efficient depending on how, when, and where the value relevant information is made available to investors. For instance, in an efficient market, a security's price should incorporate public information fully, and therefore stale information should not affect it. Yet, there is evidence that

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[10] Fama, Eugene F. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work." *The Journal of Finance* 25 (2): 383-–417 at p. 388.

[11] *See*, *e.g.* Shleifer, Andrei, and Robert Vishny. 1997. "The Limits of Arbitrage." *The Journal of Finance* 52 (1): 35–55. *See also*, Mitchell, Mark et al. 2002. "Limited Arbitrage in Equity Markets," *The Journal of Finance*, 57 (2): 551–584.

[12] *See*, *e.g.* Shleifer, Andrei and Robert Vishny. 1997. "The Limits of Arbitrage." *The Journal of Finance* 52 (1): 35–55.

[13] *See, e.g.*, D'Avolio, Gene. 2002. "The Market for Borrowing Stock." *Journal of Financial Economics* 66 (2): 271–306; Stambaugh, Robert F. et al. 2012. "The short of it: Investor sentiment and anomalies." *Journal of Financial Economics* 104 (2): 288–302.

[14] Hirshleifer, Lim, and Teoh, (2009) show that a stock incorporates new earnings related information more slowly if there are contemporaneous earnings announcements made by other firms on the same day. *See*, Hirshleifer, David et al. 2009. "Driven to Distraction: Extraneous Events and Underreaction to Earnings News." *The Journal of Finance* 64 (5): 2289–2325.

[15] In this context, Professors Grossman and Stiglitz state that "because information is costly, prices cannot perfectly reflect the information which is available, since if it did, those who spent resources to obtain it would receive no compensation." *See*, Grossman, Sanford J. and Joseph E. Stiglitz. 1980. "On the Impossibility of Informationally Efficient Markets." *The American Economic Review* 70 (3): p. 405. *See also*, Cohen, Lauren and Dong Lou. 2012. "Complicated firms." *Journal of Financial Economics* 104 (2): 383–400.

markets do sometimes react to republication of stale news.[16] There is also evidence that security prices can fail to fully and quickly reflect information from earnings announcements.[17] Other examples of security prices exhibiting behavior inconsistent with market efficiency involve the violation of "the law of one price:"[18] *i.e.*, in an efficient market, if two securities have the same underlying cash flows, they must have the same price as otherwise market participants (*e.g.*, arbitragers) would take advantage of this price divergence, causing the prices to quickly converge.

B. Market Efficiency of the Corporate Bond Markets

24. The FXCM Notes are debt instruments. The markets for debt securities differ in many ways from the markets for equity securities, and these differences have important implications for any assessment of market efficiency. Indeed, these differences could make arbitrage activities costlier and potentially impede market efficiency. Additionally, as compared to the stock market, the evidence from academic studies to date offers less support for a presumption of efficiency for the corporate bond market. Therefore, a rigorous examination of market efficiency for the FXCM Notes is warranted.

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[16] *See*, Tetlock, Paul C. 2011. "All the News That's Fit to Reprint: Do Investors React to Stale Information?" *The Review of Financial Studies* 24 (5): 1481–1512. Researchers have also found that publication in a major newspaper of news previously discussed in specialized publications can have a large effect on the stock price, which is inconsistent with EMH. *See*, Huberman, Gur. and Tomer Regev. 2001. "Contagious Speculation and a Cure for Cancer: A Nonevent that Made Stock Prices Soar," *The Journal of Finance* 56 (1): 387–396.

[17] *See e.g.*, Bernard, Victor L. and Jacob K. Thomas. 1989. "Post-Earnings Announcement Drift: Delayed Price Response or Risk Premium?" *Journal of Accounting Research* 27: 1–36; Defond, Mark L., and Jieying Zhang. 2014. "The Timeliness of the Bond Market Reaction to Bad Earnings News." *Contemporary Accounting Research* 31 (3): 911–936.

[18] Professors Lamont and Thaler document examples of large capitalization stocks violating the law of one price. *See, e.g.*, Lamont, Owen A. and Richard H. Thaler. 2003. "Can the Market Add and Subtract? Mispricing in Tech Stock Carve-Outs." *The Journal of Political Economy* 111 (2): 227–268 at pp. 230–231; Lamont, Owen A. and Richard H. Thaler. 2003. "Anomalies: The Law of One Price in Financial Markets," *The Journal of Economic Perspectives* 17 (4): 191–202.

25. Of particular import is that, while common stocks are often traded on exchanges, most corporate bonds are traded in over-the-counter ("OTC") dealer markets that are decentralized, and less transparent, and less liquid.[19] One of the key features of OTC markets is that there is no centralized pricing of securities traded in such markets, such as a central limit order book for equities. Rather, a variety of trade-specific and counterparty-related factors determine the prices of individually negotiated trades in OTC markets.[20] Therefore, the corporate bond market is much more opaque than the market for exchange-listed equity instruments, especially before trading takes place ("pre-trade") but also after ("post-trade").[21] Unlike corporate bonds, exchange-listed equities also generally trade in continuous markets, where trades can be made at any time during the trading day. In addition, participants can observe bid-ask quotes, which represent firm quotes at which investors can execute their trades, on a continuous basis before they decide to trade.[22] By contrast, in the OTC corporate bond market, executable bid-ask quotes

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[19] Ross, Stephen A. et al. 2003. *Corporate Finance*. 6th Edition. McGraw-Hill, pp. 18, 107.

[20] There is evidence that bond prices are affected by characteristics of the trade, including the urgency and quantity of the trade, and the relationship between the dealers and investors. For example, Dick-Nielsen and Rossi find that in the OTC bond market impatient investors typically pay higher prices when they buy and receive lower prices when they sell. *See*, Dick-Nielsen, Jens and Marco Rossi. 2019. "The Cost of Immediacy for Corporate Bonds." *The Review of Financial Studies* 32 (1): 1–41. Similarly, Di Maggio et al. state that "Dealers charge lower spreads to dealers with whom they have the strongest ties and more so during periods of market turmoil." *See*, Di Maggio et al. 2017. "The value of trading relations in turbulent times." *Journal of Financial Economics* 124 (2): 266–284 at p. 266. Acharya and Bisin state that these contractual terms are individually tailored to each transaction. Specifically, they write "[In OTC markets,] [c]ontractual terms such as prices and collateral that affect a trade can be tailored to mitigate counterparty risk." *See,* Acharya, Viral and Alberto Bisin. 2014. "Counterparty Risk Externality: Centralized Versus Over-The-Counter Markets." *Journal of Economic Theory* 149: 153–182 at p. 154.

[21] Bessembinder, Hendrik and William Maxwell. 2008. "Markets: Transparency and the Corporate Bond Market," *The Journal of Economic Perspectives* 22 (2): 217–234 at p. 218.

[22] For example, the NYSE is a continuous trading system. *See, e.g.* Amihud, Yakov and Haim Mendelson. 1987. "Trading Mechanisms and Stock Returns: An Empirical Investigation." *The Journal of Finance* 42 (3): 533–553 at p. 535. A continuous market is a market that involves the immediate execution of orders upon their reception by market makers and specialists. Under SEC regulations, brokers are required to execute customer trades at the best available ask price when buying securities, and the best available bid price when selling securities (*i.e.*, execute at the National Best Bid and Offer ("NBBO"). *See*, "Regulation NMS," Securities Act Release No. 34-51808, June 9, 2005, p. 160.

are not readily observable to market participants (*i.e.*, investors and broker-dealers).[23] For pre-trade price information, investors in the OTC corporate bond market can contact broker-dealers to request quotes. Traders can also observe indicative quotes from broker-dealers provided by data vendors such as Bloomberg. However, these indicative quotes, which are often representative of prior traded prices, can become stale depending on how frequently a particular security trades and do not necessarily reflect prices at which dealers are actually willing to purchase or sell a security at that time.[24]

26. In terms of post-trade transparency, FINRA also collects and disseminates the time of execution, price, yield and volume data for eligible fixed income securities through Trade Reporting and Compliance Engine ("TRACE") within 15 minutes of the transaction.[25] However, access to TRACE data is costly and for infrequently traded securities, the prices observed from TRACE can be stale due to a lack of recent transactions. Given this relative lack of price transparency, debt markets are considered to be more opaque than equity markets.

27. Research shows that a lack of transparency in security prices may be an impediment to market efficiency.[26] Furthermore, infrequent trading exacerbates this opacity. Because bonds

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[23] Corporate bond transactions may occur in traditional over-the-counter markets, or electronic markets. Electronic trading platforms, such as MarketAxess (formed in April 2000), provide institutional investors with access to multi-dealer competitive pricing. *See*, Hendershott, Terrence and Ananth Madhavan. 2015. "Click or Call? Auction versus Search in the Over-the-Counter Market." *The Journal of Finance* 70 (1): 419–447 at pp. 421, 426. *See also*, "MarketAxess Investor FAQs," *MarketAxess*, https://investor.marketaxess.com/investor-faqs. Given that the availability of electronic trading may reduce trading costs, it is important to note that electronic trading evolved throughout the Putative Class Period.

[24] Elton and Green (1998) citing Coleman, Fisher, and Ibbotson (1992) state "until about 1979, prices on dealers' quotations sheets were honored until noon the next day for small transactions. After that, quotes were indicative and although bid prices were used for internal purposes, ask prices were arbitrary." *See*, Elton, Edwin J., and T. Clifton Green. 1998. "Tax and Liquidity Effects in Pricing Government Bonds." *The Journal of Finance* 53 (5): 1533–1562 at p. 1537 footnote 2.

[25] Dick-Nielsen, Jens. 2009. "Liquidity Biases in TRACE." *The Journal of Fixed Income* 19 (2): 43–55.

[26] Bloomfield, Robert, and Maureen O'Hara. 1999. "Market transparency: Who Wins and Who Loses?" *The Review of Financial Studies* 12 (1): 5–35 at p. 5. Using laboratory experiments, Bloomfield and O'Hara (1999) show that "trade disclosure increases the informational efficiency of transaction prices." In the context of NYSE traded stocks, Boehmer, Saar, and Yu find some improvement in informational efficiency following the introduction of

trade OTC and the trading can be infrequent, investors may be poorly informed about the state of the market. This may lead to different investors paying substantially different prices to different dealers at roughly the same time.[27]

28. Furthermore, the corporate bond market is a non-centralized dealer market where dealers often have to facilitate transactions by trying to match counterparties, *i.e.*, potential buyers and sellers. Dealers who act as counterparties on trades can act either as agents or as principals. A dealer acting as a principal will use its balance sheet to facilitate a trade either by selling a bond it owns or buying a bond for its own account. In contrast, a dealer trading as an agent will need to locate an investor who wants to be on the other side of the trade, which may take time. In some cases, multiple dealers act as agents in order to facilitate a trade between a buyer and a seller, making the process of matching even more complicated and opaque.[28] Research has shown that since the 2008 financial crisis, dealers are more likely to be agents, which means that dealers have to locate one or more counterparties before a trade can take place.[29]

29. The decentralized structure described above also impacts the liquidity in the bond market, which is another important factor when assessing market efficiency. Liquidity typically refers to the extent to which a particular asset can be bought or sold quickly on the market without having a significant effect on its price.[30] Liquidity is important for informational efficiency because it allows investors to trade on new value-relevant information quickly, without incurring high

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OpenBook (*i.e.*, a service which improved pre-trade transparency on NYSE). *See,* Boehmer, E. et al. 2005. "Lifting the Veil: An Analysis of Pre-Trade Transparency at the NYSE," *The Journal of Finance* 60 (2): 783–815.

[27] Feldhütter, Peter. 2012. "The Same Bond at Different Prices: Identifying Search Frictions and Selling Pressures." *Review of Financial Studies* 25 (4): 1155–1206 at p. 1156.

[28] Li, Dan and Schürhoff, Norman. 2019. "Dealer Networks." *The Journal of Finance*. 74 (1): 91–144 at pp. 91–92.

[29] Bessembinder, Hendrik et al. 2018. "Capital commitment and illiquidity in corporate bonds." *The Journal of Finance*, 73 (4): 1615–1661 at pp. 1615, 1617.

[30] "Liquidity is generally described as the ability to trade large quantities quickly at low cost with little price impact. This description highlights four dimensions to liquidity, namely, trading quantity, trading speed, trading cost, and price impact." *See*, Liu, Weimin. 2006. "A liquidity-augmented capital asset pricing model." *Journal of Financial Economics* 82 (3): 631–671 at p. 631.

transaction costs and without the act of trading causing price distortion.[31] Liquidity can be often measured by trading volumes (*i.e.*, all things being equal higher trading volumes indicates higher liquidity) and bid-ask spreads (*i.e.*, all things being equal lower bid-ask spreads indicate lower transaction cost and higher liquidity). Implicit costs of trading, such as the amount of time it takes to find a counterparty and the ability to execute large trades without adversely affecting the price, are also indicators of liquidity.[32] If a market is illiquid, *i.e.*, the security is thinly traded and investors need to both incur substantial transaction costs and experience a long search time before finding a counterparty, it is much less likely that the security's price at a given time fully and rapidly incorporates all value-relevant public information.

30. Liquidity is different in markets for different instruments. The corporate bond market tends to have less active trading and lower liquidity than the market for exchange-listed equities. For example, large-capitalization U.S. stocks trade, on average, 1.8 times *per second*.[33] In comparison, corporate bonds trade much more infrequently, and studies have found that the median corporate bond does not trade on a majority of trading days.[34]

31. Further, I understand that the FXCM Notes were not registered with the SEC or listed on an exchange. Instead, the FXCM Notes were issued under Rule 144A, which Dr. Werner states would limit the trading to qualified institutional buyers.[35] The market for 144A bonds has been

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[31] Chordia, Tarun et al. 2008. "Liquidity and market efficiency." *Journal of Financial Economics* 87 (2): 249–268 at p. 267. The authors state "[i]n sum, this evidence is consistent with greater liquidity engendering a higher degree of informational efficiency."

[32] As stated in a literature survey, "larger bid-ask spreads and transactions costs are indicative of course, but a larger sense of liquidity really matters: how much is for sale at the bid-ask points ('depth'), and most of all how large will the 'price impact' of a trade be." *See* Cochrane, John H. 2004. "Asset Pricing: Liquidity, Trading, and Asset Prices," *NBER Reporter* (Winter): 1–12 at p. 5.

[33] Brogaard, Jonathan et al. 2018 "High frequency trading and extreme price movements," *Journal of Financial Economics* 128 (2): 253–265 at p. 255.

[34] Dick-Neilsen et al. (2012) found that the median corporate bond did not trade on 60.7% of days between 2005Q1 and 2009Q2. *See*, Dick-Nielsen, Jens et al. 2012. "Corporate Bond Liquidity before and after the Onset of the Subprime Crisis," *Journal of Financial Economics* 103: 471–492 at pp. 474–475, Table 2.

[35] "Because Rule 144A notes are held and traded solely by QIBs, the entire issue of the FXCM Notes was owned by institutional investors." *See,* Expert Report of Dr. Adam Werner, January 6, 2020 ("Werner Report"), ¶ 130.

viewed as an even more opaque and illiquid market than the registered corporate bond market.[36] Only in mid-2014 did post-trade information become available from TRACE for bonds issued under Rule 144A.[37] That is more than a decade after the same information started being disclosed for registered corporate bond offerings.[38]

32. In summary, Dr. Werner fails to adequately consider any of the contextual factors discussed above in his assessment of the FXCM Notes, including that bond markets are decentralized, more opaque, and less liquid than is generally true in equity markets.[39]

C. Dr. Werner Has No Reliable Basis to Conclude that the FXCM Notes Traded in an Efficient Market and Ignores Evidence That Would Be Inconsistent With Market Efficiency Under His Own Approach

33. According to the Werner Report, in order to assess market efficiency for the FXCM Notes, Dr. Werner: (1) analyzed in some cases modified versions of *Cammer* Factors Nos. 1–4 (average weekly trading volume, analyst coverage and institutional ownership, presence of market makers and underwriters, S-3 registration eligibility) and the two *Unger/Krogman* Factors (par value outstanding and float) and (2) analyzed *Cammer* Factor No. 5 (price reaction

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Chaplinsky, Susan, and Latha Ramchand. 2004. "The Impact of SEC Rule 144A on Corporate Debt Issuance by International Firms," *The Journal of Business* 77 (4): 1073–1098 at p. 1078. The authors note that "Rule 144A lifts registration requirements for resales of private placements as long as the security is sold to qualified institutional buyers (QIB)."

[36] Livingston and Zhou (2002) state, "[f]or investors, Rule 144A issues may be riskier than public issues. First, Rule 144A issues are less liquid than public bond issues, since the universe of buyers in both the primary and the secondary market is restricted to qualified financial institutions." *See,* Livingston, Miles and Lei Zhou, 2002. "The Impact of Rule 144A Debt Offerings Upon Bond Yields and Underwriter Fees," *Financial Management*: 5–27 at pp. 8, 26.

[37] FINRA Press Release, "FINRA Brings 144A Corporate Debt Transactions Into the Light." June 30, 2014.

[38] *See*, Edwards, Amy K et al. 2007. "Corporate Bonds Market Transaction Costs and Transparency," *Journal of Finance* 62 (3): 1421–1451 at 1422.

[39] For example, he provides a definition of market efficiency in Appendix A of his report but only makes specific reference to stocks as he states that "a stock trades in an efficient market when all publicly available information is incorporated in the stock price and any new information that impacts the economic outlook of the firm gets quickly reflected in its stock price." *See*, Werner Report, Appendix A, ¶ 1.

to new information) by conducting an event study in which he examined price reactions for the FXCM Notes on only two days.[40] As detailed below, Dr. Werner's analyses do not provide reliable evidence that the FXCM Notes traded in an efficient market throughout the Putative Notes Class Period.

34. First, Dr. Werner's analysis of *Cammer* Factors Nos. 1 and 2 (average trading volume and analyst coverage) is based on average measurements across the entire two-and-a-half-year Putative Notes Class Period. For example, Dr. Werner finds average weekly trading volume (*Cammer* Factor No. 1) to be 2.92% when measured over the entire two-and-a-half year period from June 27, 2014 to February 6, 2017.[41] The average measurements Dr. Werner uses mask the fact that there were dramatic variations in average trading volume and analyst coverage for the FXCM Notes during the Putative Notes Class Period, most crucially during the many months leading up to the alleged corrective disclosure when prices for the FXCM Notes were substantially below par and they traded sparsely and had limited analyst coverage.[42] Dr. Werner also ignores the fact that during this same period FXCM experienced dramatic changes in its business and financial condition stemming from the 2015 "flash crash" caused by the Swiss National Bank's decision to decouple the Euro and the Swiss Franc (the "SNB Flash Crash").

35. Second, beyond trading volume and analyst coverage, the evidence Dr. Werner provides on other *Cammer* and *Krogman* Factors is also deficient as he fails to substantiate several key factors for the FXCM Notes. Dr. Werner does not provide reliable evidence regarding market makers and arbitrageurs given he does not show which underwriters or firms actually served as a market maker for the Notes, and made no effort to evaluate the existence of arbitrageurs.[43] Further, even though both market capitalization and float factors, as applied by Dr. Werner, are

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[40] Werner Report, ¶¶ 124–155.
[41] Werner Report, ¶ 125.
[42] The price of the FXCM Notes is $100 when trading at par. The price of the FXCM Notes will be less than $100 when trading below par.
[43] Deposition of Dr. Adam Werner, Ph.D, February 28, 2020 ("Werner Deposition"), 111:24–113:9.

concepts based on market value, or market prices, of a security,[44] Dr. Werner focuses on "par value" (*i.e.*, face value) of the Notes instead. He ignores that the Notes' market value declined substantially during the Putative Notes Class Period. He also provides an apples-to-oranges comparison by benchmarking the Notes' par value to equity market capitalizations, even though he acknowledges that the debt and equity markets are distinct.[45] Finally, Dr. Werner also does not conduct any analysis of the bid-ask spreads for the FXCM Notes, which are an important measure when assessing liquidity.

36. Third and most importantly, Dr. Werner's assessment of *Cammer* Factor No. 5 (*i.e.*, cause-and-effect factor) is deeply flawed. His analysis is biased, unscientific, and internally inconsistent. He concludes, after examining only two dates which represented catastrophic events for the Company, that the FXCM Notes traded in an efficient market throughout the two-and-a-half year Putative Notes Class Period.[46] This method is scientifically unsound as it suffers from hindsight bias and ignores changes in the FXCM Notes trading over time.

37. Dr. Werner's treatment of the FXCM Notes is also inconsistent with his methodology for analyzing market efficiency with respect to FXCM's common stock. When conducting his event study for the common stock, Dr. Werner performed what he refers to as a "news no-news" analysis, which is supposed to test whether a security's price is more likely to have statistically significant movements on "news" days (*i.e.*, days when FXCM's 8-Ks were issued) versus "non-

[44] Dr. Werner states that "Economists have often considered the market value of a firm and its relationship with market efficiency when attempting to determine market efficiency" when discussing market capitalization and that "float excludes shares hold by insiders and affiliated corporate entities" and hence represents the market value of stock that is free to trade. *See,* Werner Report, ¶¶ 108–112. Dr. Werner also states that "[f]loat can also be analyzed as a percentage of total shares outstanding, as well as in absolute share and value terms." *See*, Werner Report, ¶¶ 112–113.

[45] Werner Deposition, 68:20–70:12.

[46] Given that one of the two dates represents the alleged corrective disclosure date after the Putative Class Period, Dr. Werner effectively only examined one date in assessing the "cause-and-effect" relationship for the FXCM Notes during the entire Putative Note Class Period.

news" days (*i.e.*, days when FXCM's 8-Ks were not issued).[47] This "news no-news" test supposedly allows Dr. Werner to feel "comfortable" drawing conclusions about market efficiency for FXCM common stock over not just a few event days but the entire Putative Notes Class Period.[48]

38. Yet, Dr. Werner fails to conduct the same type of "news no-news" analysis for the FXCM Notes. Instead, his analysis of "cause-and-effect" relies solely on his observations regarding price reactions on only one day during the multi-year Putative Notes Class Period, and on one day after the end of this period. However when the same type of "news no-news" analysis he uses for FXCM's common stock is performed for the FXCM Notes, the result does not support Dr. Werner's conclusion.[49] Indeed, the FXCM Notes did not even trade on many of the "news days" (*i.e.*, 8-K days) on which the stock price reacted in a statistically significant manner.[50] While Dr. Werner asserts that he would not expect the prices of FXCM's common stock and the FXCM Notes to always move in a similar fashion, he admits that divergent trading can indicate that one of the securities did not trade in an efficient market.[51] Additionally, Dr. Werner fails to even acknowledge this inconsistent price movement in his report, let alone investigate whether it could be evidence that the FXCM Notes did not trade in an efficient market.

[47] Dr. Werner selects dates on which 8-Ks were issued as his "news" days because "Form 8-K is the 'current report' companies must file with the SEC to announce major events that shareholders should know about" and therefore "one would expect that there would generally be a greater flow of information on event dates referred to in 8-Ks as compared to more ordinary days." *See*, Werner Report, ¶ 98.

[48] "Q. Are you comfortable drawing any reasonable conclusions [on market efficiency] based on analyzing three days over a five-year period? A Well, with -- in combination with my news/no-news study, yes." *See*, Werner Deposition, 121:12–16. "Q. As an economist conducting a market efficiency analysis, would you have concerns conducting an event study for a five-year period based on three events?... THE WITNESS: Along with my news/no-new analysis, in combination with those two things, no." *See*, Werner Deposition, 122:4–10.

[49] Note that this does not suggest I view the "news no-news" test Dr. Werner has conducted for FXCM stock as a reliable test of market efficiency.

[50] The statistical significance of the price reactions is based on the results of Dr. Werner's model. *See,* Werner Report, Exhibit 9.

[51] Werner Deposition, 70:7–12. ("…so you're asking me, hypothetically, is it possible that if a stock and a bond for the same company moved in a different direction, that one of those securities was inefficient? It is possible.")

1. Dr. Werner Fails to Address Low Trading Volumes and Analyst Coverage Over Subsets of the Notes Class Period

39. Unlike *Cammer* Factor No. 5, *Cammer* Factors Nos. 1–4 and the *Unger/Krogman* Factors are not direct tests of market efficiency. Instead, these factors look for structural features that indicate whether market conditions are conducive to new information being quickly and fully incorporated into security prices. Nonetheless, if certain of these structural features are *absent*, that could indicate the presence of frictions that may impede market efficiency. As I demonstrate below, Dr. Werner's analyses of these factors are flawed. He ignores evidence that certain of these indicative factors weigh against the notion that the FXCM Notes traded in an efficient market throughout the Putative Notes Class Period.

40. Dr. Werner notes that the *Cammer* and *Krogman* factors, other than the "cause and effect" event study, have varying degrees of economic relevance. For example, he notes that "I don't think S3 eligibility really plays into market efficiency."[52] Further, he cites an article by Barber et. al. (1994), in which the authors state that "we find [that two of the *Cammer* factors] systematically differentiate between efficient and inefficiently priced stocks, namely, the volume of trade and the number of analysts following the security."[53] These two factors are the focus of discussion in this section. In the next section, I consider Dr. Werner's assessment of the other *Cammer* and *Krogman* factors.

41. When evaluating any of the *Cammer* and *Krogman* factors, it is important to note that market efficiency can vary over time. Dr. Werner conceded during his deposition that it is possible for a security to trade in an *efficient* market during one period of time but an *inefficient*

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[52] Werner Deposition, 77:22–24.

[53] Barber, Brad et al. 1994. "The Fraud-on-the-Market Theory and the Indicators of Common Stocks' Efficiency." *Journal of Corporation Law* 19 (Winter): 285–312 at pp. 285–286.

market other times.[54] When the conditions of the market in which the security trades change drastically over time, it is important to assess market efficiency over different sub-periods and not gloss over inter-temporal changes by focusing only on a static, average, measure. Indeed, when conducting his event study for FXCM's common stock, Dr. Werner separates the five-year Putative Class Period into five one-year sub-periods because of the likelihood that the stock traded differently over time, especially before and after the 2015 SNB Flash Crash.[55] However, Dr. Werner fails to consider whether there were also changes over time in the market for the FXCM Notes.

42. The 2015 SNB Flash Crash was a catastrophic event for the Company's business and financial condition as the associated losses left FXCM with insufficient capital. To avoid liquidation, FXCM secured emergency funding of $300 million from Leucadia National Corp. in the form of a two-year senior secured term loan with an initial coupon of 10 percent as well as certain claims to asset sales.[56] As shown in **Exhibit 1**, the SNB Flash Crash and the subsequent corporate event involving Leucadia financing were associated with high volumes of FXCM Notes trading. Afterwards, the FXCM Notes traded substantially below par, FXCM lost most of its security analyst coverage, and the trading in its Notes became sparse. Dr. Werner focuses only on average measures throughout the two-and-half year long Notes Period that mask substantial periods with low trading volume and analyst coverage.

a) <u>Average Weekly Trading Volume</u>

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[54] "Q. Generally speaking is it possible for a market to be efficient at one point in time but not another? A. Is it possible? Q. Yes. A. I mean, I - - yeah, I believe it is possible. Q. So if you tested the efficiency of FXCM's securities in 2010, would that tell you whether or not the market for the same securities would be efficient today? A. No." *See*, Werner Deposition, 67:22–68:8.

[55] In particular, he notes the existence of a "structural break" for the FXCM stock. "Q. What in your experience suggested that breaking it up into sub periods was appropriate? A. Something I've oftentimes seen based on the fact that there was a structural break in the company's stock." *See*, Werner Deposition, 142:2–6. "Q. And what do you mean by "structural break"? A- Well, the stock -- as of the flash crash, the stock traded differently before and after that date." *See*, Werner Deposition, 143:2–5.

[56] "FX broker FXCM Gets Rescue from Jefferies Parent Leucadia," *Reuters,* January 16, 2015, https://www.reuters.com/article/us-swiss-snb-fxcm/fx-broker-fxcm-gets-rescue-from-jefferies-parent-leucadia-idUSKBN0KP1MY20150117, accessed April 24, 2020.

43. I first discuss *Cammer* Factor No. 1, which is average weekly trading volume. While not a direct test of efficiency, in that a market being liquid does not necessarily mean that the market is efficient, active trading and liquidity are important to ensure that information gets impounded in prices fully and rapidly. Furthermore, low liquidity in the form of high transaction costs or delays in executing trades in the desired quantity could present impediments to market efficiency.

44. Dr. Werner does not provide a clear and reliable benchmark for what level of average weekly trading volume would be consistent with bond market efficiency, let alone any scientific basis for a benchmark. With respect to FXCM's common stock, Dr. Werner states that under *Cammer* Factor No. 1, "average weekly trading [volume] of [2%] or more of the outstanding shares would justify a strong presumption that the market for the security is an efficient one; [1%] would justify a substantial presumption."[57] For the FXCM Notes, Dr. Werner acknowledges that "average weekly trading volume may be much lower for the FXCM notes than the common stock due to the inherently different nature of how bonds are transacted."[58] However, rather than acknowledging that lower liquidity could pose a problem for market efficiency, he asserts that "the typical threshold of 2% average weekly volume needed for a strong presumption of market efficiency should be relaxed in assessing bond efficiency."[59]

45. Yet, Dr. Werner provides no reliable basis for his claim that a lower threshold is appropriate for the FXCM Notes, let alone what that "relaxed" threshold would be to benchmark the FXCM Notes' turnover.[60] Absent a bond-specific benchmark, Dr. Werner instead compares

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[57] Werner Report, ¶ 24; *See also*, *Cammer v. Bloom*, 711 F. Supp 1264, 1293 (D.N.J. 1989).
[58] Werner Report, ¶ 123.
[59] Werner Report, ¶ 123.
[60] At deposition, Dr. Werner testified that he did not attempt to assess a benchmark of "typical" bond trading. "Q. What, in your experience would be the typical trading volume or turnover as a percentage of par for a corporate bond? A. I have no way to answer that. Typical? I have no idea." *See,* Werner Deposition, 194:5–9. I also note that benchmarking to a "typical" bond could still be problematic, given that compared to stocks, there is much less

the FXCM Notes' trading volume, which he finds to average 2.92% weekly as a percentage of outstanding par value, to the 2% *Cammer* threshold for equity securities.[61] Dr. Werner provides no justification why it is appropriate to apply the *Cammer* benchmark developed for equities to the bond market, which as discussed above is "inherently different."

46. Furthermore, Dr. Werner's analysis of the FXCM Notes' average weekly trading volume fails to accurately depict the evolving liquidity conditions of the FXCM Notes during the Putative Notes Class Period. Indeed, Dr. Werner's focus on the average weekly trading volume of the FXCM Notes over the course of two-and-a-half years, a measure susceptible to the influence of outliers, ignores the fact that the Notes traded infrequently and at well below 2% for the majority of the Putative Notes Class Period.

47. As shown in **Exhibit 2**, throughout the Putative Notes Class Period, the FXCM Notes traded on only about 26% of trading days, meaning approximately only *one in four* days had a trade.[62] Furthermore, the number of days with trades decreased substantially during the Putative Notes Class Period. During 2016 and through February 6, 2017, the FXCM Notes traded on only about 13% of trading days.

48. Further, average weekly trading volume for the FXCM Notes varied substantially throughout the Putative Notes Class Period. The SNB Flash Crash and the Leucadia emergency funding event caused substantial spikes in trading volume that skew Dr. Werner's findings.

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academic evidence to support the notion that a typical corporate bond would be consistently traded in an efficient market with respect to corporate specific information.

[61] "[T]he weekly average trading volume as a percentage of the par value of outstanding notes for the FXCM notes was 2.92%. This level of average weekly trading volume exceeded the Cammer benchmark of 2% necessary for a 'strong presumption' of market efficiency for common stock securities." *See,* Werner Report, ¶ 125.

[62] For comparison, Dick-Nielsen et. al. (2012) show that the median number of days for which a U.S. corporate bond trades is 39.3% between 2005Q1 and 2009Q2. *See*, Dick-Nielsen, Jens et al. 2012. "Corporate Bond Liquidity before and after the Onset of the Subprime Crisis," *Journal of Financial Economics* 103: 471–492 at p. 475, Table 2.

From a statistical perspective, when data is skewed by these types of outliers, the median is more instructive than mean when assessing the typical value.[63]

49. A review of the median turnover of the FXCM Notes, as opposed to the average turnover, helps to demonstrate this as the median weekly trading turnover during the Putative Notes Class Period was 0.49%, driven by a large number of weeks with low or no trading volume. During the Putative Notes Class Period, there were 35 weeks which had a weekly trading volume greater than 2% (approximately 25% of all weeks) compared to 103 weeks which had a weekly trading volume less than 2% (approximately 75% of all weeks). When compared with a 1% threshold, 90 of the 138 weeks had a weekly trading volume less than 1% (approximately 65% of all weeks). Furthermore, 44 out of the 138 weeks during the Putative Notes Class Period (approximately 31% of all weeks) had *no trading at all* during the entire week.[64]

50. Additionally, these periods of high and low trading volume were not evenly distributed across the Putative Notes Class Period, with trading volumes declining over time. During the second half of the Putative Notes Class Period (October 17, 2015 to February 6, 2017), a period of 69 weeks, the average weekly trading volume of the FXCM Notes was 0.98% and the median weekly trading volume was merely 0.01%. During this same period there were only nine weeks that had an average trading volume greater than 2% (approximately 13% of weeks) compared to 60 weeks with a weekly trading volume less than 2%. Additionally, 31 out of these 69 weeks (approximately 44% of weeks) had no trading at all.[65] Thus, over the second half of the Putative Notes Class Period, trading volume for the FXCM Notes was substantially below the 2% threshold, or even the 1% threshold in *Cammer*.[66]

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[63] "[] the median corresponds more closely than the mean to the middle of the distribution. It is unaffected by extreme values." *See*, Greene, William H. 2002. *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall, p. 847.
[64] Werner Report, Exhibit 3b.
[65] Werner Report, Exhibit 3b.
[66] "[T]he court credited Bromberg who recognized that, 'turnover measured by average weekly trading volume of [2%] or more of the outstanding shares would justify a strong presumption that the market for the security is an

51. Testimony by Lead Plaintiff 683 Capital Partners, LP ("683 Capital") is consistent with evidence of illiquidity of the FXCM Notes. 683 Capital acknowledged that the FXCM Notes did not trade frequently and that it was unable to buy and sell the desired quantity of the FXCM Notes immediately.[67] 683 Capital also described having to individually negotiate trades with brokers, and it was not able to execute trades at a desirable trading cost.[68]

b) Analyst Coverage:

52. Dr. Werner also considers *Cammer* Factor No. 2, analyst coverage, stating that under this factor, "'a significant number of securities analysts['] follow[ing] and report[ing] on a company's stock' further supports a finding of market efficiency" and "that the more analysts who followed a stock, the greater the likelihood that a stock traded in an efficient market."[69] He also states that "[w]hen investment professionals closely monitor a firm's information, subsequently making buy/sell recommendations to their clients based on that information, investors bid up or down 'the market price of the stock . . . to reflect the [company's] financial information."[70] Dr. Werner finds that "at least nine firms/analysts following FXCM issued recommendations and/or research reports" which contributed to "at least 89 reports and recommendations during the Notes Period."[71]

53. Dr. Werner's assessment of analyst coverage for the FXCM Notes is flawed because he fails to ascertain whether there was coverage specific to the Notes. Instead, when measuring

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efficient one; [1%] would justify a substantial presumption.'" *See*, Werner Report, ¶ 24 citing *Cammer v. Bloom*, 711 F. Supp 1264 (D.N.J. 1989).

[67] "Q. Does the FXCM notes trade frequently in your experience? A. No. Q. Were you in a position that you could always buy or sell the quantity you wanted to buy or sell immediately? A. No." *See,* Remote Video Deposition Of: Joseph S. Patt, 683 Capital, April 23, 2020 ("Patt Deposition"), 109:8–14.

[68] "Q. What were the limitations on that? A. You had to make a conversation and the spread could be, you know, point a wide, half a point wide, four points [wide], ten points wide in really bad markets." *See,* Patt Deposition, 109:15–19.

[69] Werner Report, ¶ 26 citing *Cammer v. Bloom*, 711 F. Supp 1264 (D.N.J. 1989).

[70] Werner Report, ¶ 26 citing *Cammer v. Bloom*, 711 F. Supp 1264 (D.N.J. 1989).

[71] Werner Report, ¶ 126.

analyst coverage, Dr. Werner asserts that coverage for the bonds "is not necessarily a separate measure [than the coverage for equity]."[72] He consequently uses the same set of analyst reports when assessing coverage for FXCM's common stock and the Notes. He does not document which reports or how many specifically focused on the Notes.[73]

54. Further, Dr. Werner's assessment of analyst coverage with respect to the FXCM Notes is inconsistent with his testimony regarding the differences between equity and debt, *i.e.*, his suggestion that unlike for common stock, only information pertaining to probability of default would be relevant to Notes holders.[74] Yet, Dr. Werner's report does not address the fact that none of the major credit rating agencies (*e.g.*, S&P, Moody's, or Fitch), which would have specifically focused on the likelihood of default, covered the FXCM Notes during the Putative Notes Class Period. Instead, Dr. Werner chooses to focus on analyst coverage that, by his own admission, was primarily equities-focused.[75]

55. Further, Dr. Werner's focus on the total number of analysts and reports over the course of the entire Putative Notes Class Period masks substantial changes in coverage of FXCM over time. As shown in **Exhibit 3**, the number of analyst reports released by quarter decreased drastically over the course of the Putative Notes Class Period. In particular, there is a large decline after the SNB Flash Crash in January 2015. Indeed, Dr. Werner identifies only five reports that were released during either 2016 or in 2017 prior to the alleged corrective disclosure. The last analyst report during the Putative Notes Class Period was released on November 10, 2016, almost three months before the alleged corrective disclosure.[76] It is not clear how Dr. Werner can opine that analysts were "following and reporting on a company" and "making buy/sell recommendations to their clients" for sub-periods when no reports were actually issued.[77]

[72] Werner Report, ¶ 123.
[73] Werner Deposition, 214:12–216:12.
[74] Werner Deposition, 247:6–248:9.
[75] Werner Deposition, 214:12–216:12.
[76] Werner Report, Exhibit 4.
[77] Werner Report, ¶ 26.

2. Dr. Werner Does Not Reliably Address the Other *Cammer* and *Krogman* Factors that He Applied to the Notes

56. In this section, I discuss additional flaws in Dr. Werner's assessment of *Cammer* Factor No. 3 (number of market makers and existence of arbitrageurs) and the *Unger/Krogman* factors (bid-ask spread, par value, and float).

a) <u>Market Makers and Arbitrageurs:</u>

57. *Cammer* Factor No. 3 was described by the *Cammer* Court as "the existence of market makers and arbitrageurs."[78] In contrast to FXCM's common stock, Dr. Werner does not have any data on which firms, if any, served as market makers for the FXCM Notes.[79] Rather, he states that underwriters to a debt offering "typically then serve as market makers for the notes,"[80] that the proportion of dealer trades from TRACE data implies a large number of dealers were facilitating transactions,[81] and that "Barclays, Sandler O'Neill, and UBS published reports stating that they made a market in FXCM *securities* during the Class Period."[82] (emphasis added)

58. None of Dr. Werner's assertions regarding market makers for the FXCM Notes is supported by reliable evidence. What matters here is whether the FXCM Notes specifically had market makers throughout the Putative Notes Class Period, a topic which Dr. Werner fails to address. He has no evidence of which, if any, of the underwriters made a market in the FXCM

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[78] Werner Report, ¶ 33 citing *Cammer v. Bloom,* 711 F. Supp 1264 (D.N.J. 1989).
[79] A market maker is "[a] trader who is willing to quote both bid and offer prices for an asset." *See*, Hull, John C. 2009. *Options, Futures and Other Derivatives*. Upper Saddle River, NJ: Prentice Hall, p. 831. In equity markets, "market makers" refers to a firm that stands ready to buy and sell a particular stock on a regular and continuous basis at a publicly quoted price. *See*, for example, "Fast Answers: Market Maker," *U.S. Securities and Exchange Commission,* https://www.sec.gov/fast-answers/answersmktmakerhtm.html. In an over-the-counter bond market, a market maker is a dealer who both sells to and also buys from customers or other dealers, and is compensated by means of price differentials for the service of providing liquidity and facilitating trades.
[80] Werner Report, ¶ 132.
[81] Werner Report, ¶ 134.
[82] Werner Report, ¶ 133.

Notes, and over what period.[83] Dr. Werner also asserts that "according to the trades reported to TRACE, between 35% and 40% of the trades reported were dealer transactions which results from a large number or dealers facilitating transactions…."[84] However, he admitted during his deposition that TRACE data does not identify specific dealers, so one cannot use this data to ascertain which dealers made a market in the FXCM Notes.[85] Three analyst firms that he references (Barclays, Sandler O'Neill, and UBS) never specifically stated that they made a market in the FXCM Notes, but rather refer to FXCM securities in general, with Barclays specifically noting that it served as a market-maker for the FXCM common stock.[86]

59. Further, Dr. Werner does not address *Cammer* Factor No. 3's reference to arbitrageurs. Trading and competition among arbitrageurs is critical to ensure market efficiency because, as noted by the *Cammer* court, "these individuals would react swiftly to company news and reported financial results by buying or selling stock and driving it to a changed price level."[87] When asked about this factor during his deposition, Dr. Werner admitted that he simply did not

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[83] "Q. Okay. Does Fabozzi discuss how long an investment bank will act as a market maker after the initial issuance of a note? A. As I sit here, I don't recall. Q. Do they discuss whether all of the underwriters who are involved in the initial issuance of a note will continue on as market makers? A. As I sit here, I don't recall. Q. Do you know in connection with this analysis how long any of these underwriters operated as a market maker in connection with the FXCM notes? A. I don't - - I need to relook at - - I need to relook at the TRACE data but as I sit here, no." *See,* Werner Deposition, 227:21–228:10.

[84] Werner Report, ¶ 134.

[85] "Q. Do you know if the TRACE data identifies which dealers are trading the notes? A. Well, I -- when you say "which dealers," you mean -- I don't believe so, as I sit here today, but, again, I would need to look at the data specifically to refresh my memory." *See,* Werner Deposition, 240:6–11.

[86] In fact, Barclays specifically notes that "Barclays Bank PLC and/or an affiliate is a market-maker and/or liquidity provider in equity securities issued by this issuer or one of its affiliates." *See*, "Focused on the Opportunity Set Available," *Barclays*, March 13, 2015, p. 8. Sandler O'Neill states that "Sandler O'Neill expects to receive or intends to seek compensation from FXCM Inc. for investment banking services in the next three months." *See*, "Transforming the Business Model: A Focus on Larger, More Active Accounts," *Sandler O'Neill + Partners*, November 7, 2014, p. 11. UBS states that "UBS Securities LLC makes a market in the securities and/or ADRs of this company." *See*, "Solid 3Q; 4Q Starting Even Stronger; Pricing Commentary Should Not Come as a Surprise' *UBS*, November 7, 2014, p. 9.

[87] *Cammer v. Bloom*, 711 F. Supp. 1264, 1287 (D.N.J. 1989).

know the answer.[88] Finally, for FXCM's common stock, Dr. Werner references "[l]isting on the NYSE" as part of his analysis of *Cammer* Factor No. 3.[89] Dr. Werner does not mention that the FXCM Notes were not listed on any exchange.

b) <u>Bid-Ask Spread:</u>

60. For the FXCM common stock, one of the *Krogman* factors that Dr. Werner assesses is bid-ask spread. He states that "[a] narrow bid-ask spread of a particular security is also often associated with market efficiency."[90] While not a direct test of market efficiency, bid-ask spreads are a measure of trading cost, an important indicator of market liquidity. Professor Fama, in his seminal paper on market efficiency cited by Dr. Werner, discusses the role that transaction costs may play as a "potential source" of inefficiency.[91] In contrast to his assessment of the common stock, Dr. Werner does not analyze bid-ask spreads for the FXCM Notes. Moreover, lead Plaintiff 683 Capital acknowledged during deposition that the bid-ask spreads on the FXCM Notes were at times wide during the Putative Notes Class Period. 683 Capital testified that "the spread could be, you know, [a] point wide, half a point wide, four points [wide], ten points wide in really bad markets."[92] A point corresponds to $1 or 1% of par indicating that according to 683 Capital, bid-ask spreads for the FXCM Notes at times were higher than 10%.[93]

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[88] "Q. Did you conduct any analysis to determine whether or not arbitrageurs existed in trading for the FXCM notes? A. I do not know - - I have not pulled the market participants and asked them why they bought or sold the notes. Q. Okay. A. Which is what I would need to determine whether or not they were arbitrageurs." *See,* Werner Deposition, 242:19–243:2.

[89] Werner Report, Section V.A.iii.

[90] Werner Report, ¶ 115.

[91] "But though transaction costs, information that is not freely available to all investors, and disagreement among investors about the implications of given information are not necessarily sources of market inefficiency, they are potential sources. And all three exist to some extent in real world markets." *See*, Fama, Eugene. 1970, "Efficient Capital Markets: A Review of Theory and Empirical Work," *The Journal of Finance*, 25 (2): 383–417, at p. 388.

[92] Patt Deposition, 109:15–19.

[93] For most of the Putative Notes Class Period the FXCM Notes traded below par, which means a $1 spread would be larger than 1% of the market price of the Notes.

c) **Market Capitalization and Float:**

61. Finally, Dr. Werner purports to analyze "outstanding par value and float" for the FXCM Notes. The two relevant *Krogman* factors for this analysis refer to the market capitalization of a security as well as the float.[94] Dr. Werner recognizes that market capitalization is based on market value, or market prices.[95] Similarly, as applied by Dr. Werner, float can be considered in "value terms," which also depend on market prices.[96] Instead of looking at the market value for the FXCM Notes, however, Dr. Werner inexplicably focuses only on the "par value" of the Notes (*i.e.*, face value, or the total amount that FXCM is required to pay back at maturity, which can be very different from market value, particularly for a financially distressed company) when evaluating both of these *Krogman* factors.

62. As he solely focuses on the par value of the Notes, Dr. Werner fails to mention that the market value and float for the FXCM Notes were much lower than the par value during most of the Putative Notes Class Period. Indeed, the Notes' market value declined drastically after the SNB Flash Crash, at times to roughly $60 million, far lower than the $173 million par value he references.[97]

63. In assessing the par value, Dr. Werner states that the FXCM Notes' par value outstanding "was larger than the market capitalization of at least 40% of all public companies listed on the NYSE, AMEX, NASDAQ, and ARCA during the Class Period."[98] First, if one were to use the

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[94] *Elmer Krogman v. R. Dale Sterritt, Jr.*, LEXSEE 202 F.R.D. 467 (2001) at HN20–22.

[95] Werner Report, ¶¶ 108, 153. Dr. Werner also analyzes the market value, rather than the "par value" of the FXCM common stock, in his *Krogman* factors analysis of the common stock (Werner Report, ¶¶ 110, 112).

[96] Dr. Werner states that "[f]loat can also be analyzed as a percentage of total shares outstanding, as well as in absolute share and value terms." *See*, Werner Report, ¶¶ 112–113.

[97] For example, FXCM's Note market value was approximately $58 million on July 25, 2016. The market value is calculated as the price of the FXCM Notes on July 25, 2016 of $33.50 divided by 100, multiplied by the face value of the FXCM Notes of $173 million. *See,* Werner Report Production Materials.

[98] Werner Report, ¶ 155. Dr. Werner also inexplicably includes the following information to explain his calculation. "The aggregate par value of the AF3 Notes totaled $1.0 billion and was larger than the market capitalizations of at least 70% of all public companies listed in U.S. during the period August 2010 through September 2011." *See,* Werner Report, ¶ 154, footnote 153. Dr. Werner does not explain what the "AF3 Notes" are, how the market

market value of the FXCM Notes, this percentage varies widely during the Putative Class Period. For example, on July 25, 2016, the market value of the FXCM Notes was approximately $58 million which was only greater than about 24% of all public companies used in Dr. Werner's comparison.[99] Second, by comparing bond par value to equity market capitalization, Dr. Werner's analysis simply represents an apples-to-oranges comparison. It is not instructive, from an economic perspective, in measuring the relative size of the FXCM Notes or its implication on market efficiency. I have not seen such a comparison done in a peer-reviewed academic article published in the field of financial economics. Dr. Werner himself has repeatedly emphasized that debt and equity markets function differently. As such, it is not clear what, if any, conclusion he can draw by benchmarking a debt par value outstanding (or market value outstanding) to equity market capitalizations.

3. Dr. Werner's Event Study Does Not Provide Reliable Evidence of Market Efficiency for the FXCM Note

64. From the perspective of a financial economist, only *Cammer* Factor No. 5, which assesses whether there is a cause and effect relationship between the release of new, value relevant information and a security's price response, directly tests market efficiency. Dr. Werner appears to agree, stating in his report that "[t]he event study is the paramount tool for testing market efficiency."[100] Dr. Werner also cites Professor Fama, who writes that "[t]he cleanest

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capitalization totaled to $1 billion, or why the period used was between August 2010 through September 2011. The par value for FXCM Notes was only $173 million.

[99] The market value is calculated as the price of the FXCM Notes on July 25, 2016 of $33.50 divided by 100, multiplied by the face value of the FXCM Notes of $173 million. *See,* Werner Report Production Materials.

[100] Werner Report, ¶ 50.

evidence on market-efficiency comes from event studies, especially event studies on daily returns."[101]

65. To assess *Cammer* Factor No. 5 for the FXCM Notes, Dr. Werner conducts an event study where he examines the Notes' price reaction on only two days. The first date is January 16, 2015, the date of the SNB Flash Crash, which resulted in the threat that FXCM would breach its regulatory capital requirements.[102] The second is February 7, 2017, the trading day following the alleged corrective disclosure in this case when the CFTC and the National Futures Association ("NFA") took regulatory actions against FXCM, which forced FXCM to exit the U.S. business.[103] On both of these dates, Dr. Werner finds that the FXCM Notes had large and statistically significant negative returns. On these two days, the residual Notes' return on a logarithmic basis under Dr. Werner's event study was -58.47% and -42.35% respectively.[104]

66. However, as detailed in this section, Dr. Werner's assessment of the FXCM Notes price reaction on these two days does not provide reliable evidence of market efficiency *throughout* the Putative Notes Class Period, given that he (1) only examines two trading days, one of which falls outside the Putative Notes Class Period, (2) selects these dates in an unscientific and biased way, and (3) does not test if the FXCM Notes traded efficiently with respect to the specific type of information alleged to have been misrepresented.

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[101] Werner Report, ¶ 50. During his deposition, Dr. Werner also stated "I think economists, when they talk about market efficiency, oftentimes discuss event studies." *See,* Werner Deposition, 101:9–11.

[102] Werner Report, ¶¶ 85, 138–140. According to Dr. Werner, "On Thursday, January 15, 2015, after the close of trading, the Swiss National Bank announced that it would be 'discontinuing the minimum exchange rate of CHF 1.20 per euro.' FXCM issued a press release announcing that the EUR/CHF currency pair had experienced unprecedented volatility and FXCM 'clients experienced significant losses' and 'generated negative equity balances,' owing FXCM approximately $225 million." The first trading day that Dr. Werner examines for the Note that could incorporate this information is January 16, 2015.

[103] Werner Report, ¶¶ 90–91, 138–140. The CFTC order was released after market hours on February 6, 2017. The first trading day during which the FXCM note could have incorporated this news was February 7, 2017.

[104] Werner Report, Exhibit 12.

67. First, an event study examining the Notes price reaction on only two trading days cannot reliably demonstrate market efficiency throughout the two-and-half year Putative Notes Class Period. Evidence from financial economics literature shows that it is important to test for efficiency over a specific period of time. As discussed above, trading in the FXCM Notes and analyst coverage of the FXCM Notes changed drastically throughout the Putative Notes Class Period. Given the pattern of inconsistent and declining liquidity and analyst coverage, it is crucial to design any assessment of market efficiency in a way that accounts for these changes. Not only does Dr. Werner fail to do this, but he also does not test even a single event date for the two-year period between February 2015 and the end of the Putative Class Period in February 2017.

68. At his deposition, Dr. Werner conceded that it would be insufficient to consider "only two snapshots in time" in order to derive a conclusion regarding market efficiency for a multi-year period in-between.[105] Yet, that is exactly the approach he takes for the FXCM Notes.

69. It is instructive that Dr. Werner takes a different approach when assessing FXCM's common stock. There, in addition to examining three individual event days, he also conducts a "news no-news" test that examines more than 100 "news" releases issued throughout the Putative Class Period.[106] During his deposition, he tied this test to the need to examine trading throughout the Putative Class Period, rather than looking only at a small number of days.[107]

70. As discussed below in **Section IV.C.4**, if Dr. Werner's "news no-news" methodology is applied to the FXCM Notes, the result is inconsistent with his conclusion of market efficiency

[105] "Q. [I]f you tested the efficiency of a security in 2010 and today [2020], would that tell you whether the market for that security would be efficient throughout 2015? A. So I looked at two snap shots in time. That - - is it possible? It's possible. My guess is it would not be sufficient to determine - - to opine upon market efficiency." *See,* Werner Deposition, 68:10–17.

[106] For the purpose of this test, Dr. Werner defines "news" as days on which FXCM filed an 8-K, of which there were 107 during the stock Class Period. *See*, Werner Report, ¶ 97.

[107] "Q. Sitting here today as an economist, do you have a view on - - for a Class Period of five years how many events would be too few events? A. It's not anything I've thought about. I mean, again, that is the purpose of including a news/no-news analysis as it looks at news over the entire Class Period." *See,* Werner Deposition, 123:17–23.

under Dr. Werner's own framework. The FXCM Notes did *not* have a statistically different proportion of significant Notes returns on "news" days than "non-news" days.

71. Second, even putting aside whether examining two dates can provide reliable evidence of efficiency throughout a two-and-half year period, Dr. Werner's selection of these two event dates is flawed, unscientific, and suffers from hindsight bias. His analysis therefore provides little evidence regarding whether the price of the FXCM Notes consistently incorporated public, value-relevant information, including the information at issue in this case, during the Putative Notes Class Period. When conducting an event study, it is important to use objective criteria to define ex-ante, meaning prior to knowing the security price movements, a set of events to study. Absent such objective criteria, the analysis would be unscientific: a different expert could not replicate the event study or determine whether the original researcher identified events in a way that would bias the results to reach the desired conclusion.

72. Dr. Werner appears to recognize the importance of having an objective criteria–with respect to his "news no-news" test for the stock, he states that "[i]t is important to use a specific and objective criterion to identify news events."[108] However, he does not identify such an objective set of criteria that he uses to select the two event days he considers here.

73. To explain how he identified January 16, 2015, Dr. Werner states that he "reviewed the Company's press releases during the Class Period to identify any regulatory capital requirement breach announcements."[109] Yet the construction of his search suggests that Dr. Werner was already aware that there was a threatened breach of regulatory capital requirements which was accompanied with a large stock price decline. Indeed, he testified at his deposition that he had "read about [the regulatory capital breach] prior to conducting [his] event study."[110]

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[108] Werner Report, ¶ 97.
[109] Werner Report, ¶ 63.
[110] "Q. So for your event study - - before you conducted the event study in this case, what did you know about FXCM as a company? A. Before I performed the event study? Q. Correct. A. I mean, I suppose I had probably

74. In addressing his selection of February 7, 2017 as an "Allegation-Related Disclosure Event", Dr. Werner states that "[b]ased on my review of the contemporaneous news media and analyst reports published during the Class Period, I determined that one date fit my event selection criteria."[111] However, Dr. Werner does not explain what "event selection criteria" he used to make this determination. An alleged corrective disclosure date will clearly be a date on which a large negative stock price movement can be expected to have occurred. Relatedly, this price movement was discussed in the Complaint, which Dr. Werner stated he reviewed prior to conducting his event study.[112] Dr. Werner would therefore presumably have known when choosing this date that a large security price movement had occurred on this day.

75. His selection of these dates suffers from a well-known bias in statistics and economics called hindsight bias. Hindsight bias occurs when a researcher's knowledge of what has actually occurred informs the construction of the hypothesis being tested.[113] Here, Dr. Werner selects only two event days and presumably knew prior to conducting his test that there were large negative price movements associated with these days. Such a test by design will likely find a significant abnormal price returns. In plain language, such a test is unreliable and unscientific.

76. Finally, Dr. Werner's analysis of the price reactions to these two events does not provide reliable evidence as to whether any alleged misrepresentations would have been incorporated into the price of the FXCM Notes throughout the Putative Notes Class Period. The academic literature has shown that prices can react differently to different types of information, and depending on how and where this information is made available. It also appears that investors

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read the complaint and read some analyst articles before the event study was performed." *See,* Werner Deposition, 114:13–20. "Q. Were you aware of the January 2015 regulatory capital breach before you conducted your event study? A. Well, I believe I had read about it prior to conducting my event study." *See,* Werner Deposition, 131:9–13.

[111] Werner Report, ¶ 69.

[112] The Complaint notes that following the February 6, 2017 disclosure "the price of FXCM Notes fell 37%." *See*, Complaint, ¶ 83.

[113] *See, e.g.*, Shiller, Robert. 2000. *Irrational Exuberance*. Princeton, NJ: Princeton University Press, p. 143.

may pay more attention to information that is easier to process.[114] For example, there is evidence that markets react to information that is more salient but may not react quickly and fully to information that is less salient.[115] A well-cited example in finance literature involves a biotech company EntreMed that experienced a 330% increase in its stock price after the *New York Times* mentioned the company in a front-page article in relation to a breakthrough in cancer research, after the relevant information had been published in a scientific journal, *Nature*, months earlier.[116] This demonstrates that the information released earlier that was less salient and accessible only to specialists was not fully and rapidly incorporated into the stock price.[117] As such, analyzing price reactions to catastrophic, headline events like the ones Dr. Werner focuses on does not necessarily provide evidence on whether the market would have efficiently incorporated allegedly misrepresented information regarding FXCM's NDD platform, which is the information at issue here.

77. Dr. Werner appears to recognize the importance of specifically testing efficiency with respect to the type of information that allegedly was misrepresented or omitted. He states that the *Cammer* Court "recognized the special importance of the information allegedly misrepresented that is the subject of the litigation" and quotes the *Cammer* Court's statement that: "The central question under the fraud on the market theory is whether the stock price, *at the*

[114] *See, e.g.*, Aboody, David. 1996. "Recognition versus Disclosure in the Oil and Gas Industry." *Journal of Accounting Research*, 34, 21–32. *See also,* Sloan., Richard G. 1996. "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows About Future Earnings?" *The Accounting Review* 71 (3): 289–315.

[115] *See for example*, Huberman, Gur and Tom Regev. 2001. "Contagious Speculation and a Cure for Cancer: A Nonevent that Made Stock Prices Soar." *The Journal of Finance* 56 (1): 387–396. As one study surveying the literature puts it, "[s]alient news carries greater weight in market prices." *See* Daniel, Kent et al. 2002. "Investor psychology in capital markets: evidence and policy implications." *Journal of Monetary Economics* 49 (1): 139–209 at p. 169; *See also*, Gilbert, Thomas et al. 2012. "Investor Inattention and the Market Impact of Summary Statistics." *Management Science* 58 (2): 336–350.

[116] *See, e.g.,* Huberman, Gur and Tom Regev. 2001. "Contagious Speculation and a Cure for Cancer: A Nonevent that Made Stock Prices Soar," *The Journal of Finance* 56 (1): 387–396 at pp. 387, 391.

[117] Hong, Harrison and Jeremy Stein. 2007. "Disagreement and the Stock Market," *Journal of Economic Perspectives* 21 (2): 109–128 at p. 116.

time a plaintiff effected a trade, reflected the 'misinformation' alleged to have been disseminated."[118] He attempts to use this as rationale for why he examines the price movement on the alleged corrective disclosure day. He does not explain, however, why he chooses not to examine the price movements associated with the 21 alleged misstatements identified in the Complaint.[119]

78. More importantly, as discussed in **Section V** below, Dr. Werner does not establish that the price reaction on the alleged corrective disclosure day captures the reaction to correction of what was allegedly misrepresented regarding FXCM's NDD model rather than collateral consequences of the disclosure (*i.e.*, reputational effects and regulatory ramifications, including forced asset sales). As a result, Dr. Werner does not demonstrate that the alleged corrective disclosure date is instructive as to market efficiency with respect to the information at issue in this case.

4. Notes Price Movements on 8-K Days Provides Evidence Inconsistent with the FXCM Notes Trading in an Efficient Market Under Dr. Werner's Own Framework

79. As discussed above, Dr. Werner's methodology for assessing *Cammer* Factor No. 5 differs for FXCM's common stock and the FXCM Notes. Specifically, for the FXCM common stock Dr. Werner examines three individual event dates, but he also conducts what he describes as a "news no-news" test. Under such a test, he examines if the proportion of days with statistically significant price returns among the "news" days is higher than the proportion among the "non-news" days. However, he conducts no such analysis for the FXCM Notes. When applying the same methodology Dr. Werner uses for the stock and using Dr. Werner's event study for the FXCM Notes, the results of this test provides evidence inconsistent with his

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[118] Werner Report, ¶ 66.
[119] Complaint, ¶¶ 103–124.

conclusion of the FXCM Notes trading in an efficient market under Dr. Werner's own framework.

80. Dr. Werner describes the relevance of his "news no-news" test as follows, noting that "[a]s explained by Ferrillo, Dunbar and Tabak in their article published in 2004 in the *St. John's Law Review*, if the proportion of significant price movements on news days is statistically significantly different than on non-news days, 'then the evidence would show that, on average, the stock price reacts to news announcements.'"[120] What Dr. Werner fails to acknowledge is that that those authors go on to state in that article that "*if the difference is not statistically significant, then there would be no basis for saying that the defendant's stock price is affected by news."* (emphasis added).[121]

81. From the perspective of an economist, this type of "news no-news" analysis is a threshold test at best, and is not sufficient to determine whether the market for a security is efficient. In particular, this type of analysis only evaluates whether the volatility of price movements is larger on so called "news" days, but it does not evaluate whether the price "fully" and "rapidly" reflects information. In fact, Professor Fama, in an article that Dr. Werner cites, states that "volatility" tests effectively akin to Dr. Werner's "news no-news" test are insufficient tests of market efficiency because these types of tests "give no help on the central issue of whether the variation in expected returns is rational."[122] However, while Dr. Werner's "news no-news" test cannot demonstrate whether the market for a security is efficient, as the authors of the article Dr. Werner relies on state, finding no difference in return volatility between "news" days and "no-news" days could indicate market *in*efficiency.

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[120] Werner Report, ¶ 100.
[121] Ferrillo, Paul A. et al. 2004. "The 'Less Than' Efficient Capital Markets Hypothesis: Requiring More Proof From Plaintiffs in Fraud-On-The-Market Cases," *St. John's Law Review* 78 (1): 81–129 at pp. 120–121.
[122] Fama, Eugene F. 1991. "Efficient Capital Markets: II," *The Journal of Finance* 16 (5): 1575–1617 at p. 1586.

82. Here, Dr. Werner does not explain in his report why it was appropriate to conduct a "news no-news" test for the common stock but not for the FXCM Notes. When Dr. Werner was asked during his deposition whether he could use a small set of sample events to draw a market efficiency conclusion over a multi-year period for FXCM's stock, Dr. Werner emphasized that he also relied on the "news no-news" analysis.[123] When asked about why he did not do a similar news no-news analysis for the FXCM Notes, Dr. Werner did not suggest it would be impossible or inappropriate to do so, but simply that he had not seen it done before in prior litigation cases.[124]

83. I have applied the "news no-news" test to the FXCM Notes, using a methodology consistent with Dr. Werner's Notes event study and the "news no-news" test Dr. Werner conducted for FXCM's common stock. Dr. Werner implemented his test by:

a. Comparing "the stock price reactions on a sample of 'news days' to all other 'non-news days.'"[125]

b. Identifying "news" days as "as unique days on which the Company filed an 8-K"[126] which he characterizes as "a specific and objective criterion to identify news events that contain a higher flow of information."[127]

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[123] "Q. Are you comfortable drawing any reasonable conclusions [on market efficiency] based on analyzing three days over a five-year period? A. Well, with -- in combination with my news/no-news study, yes." *See*, Werner Deposition, 121:12–16.

[124] Werner Deposition, 262:25–268:7. "Q. Of the reasons you did not do a news/no-news analysis, one of them were the reasons in paragraph 137; correct? A. That is correct. Q. One of them is you do not believe it is an industry standard to do a news/no-news analysis for bonds; is that correct? A. If that is what I stated, then that is correct. … Oh, so now the statement is it is not an industry standard. I do not believe I have seen a news/no-news analysis performed for bonds before." *See,* Werner Deposition, 266:24–267:7, 268:2–5. In addition, when pressed on whether it was possible, Dr. Werner testified in his deposition that: "As I stated before, is it possible? So in the grand -- in the world of possibilities, yes, it is possible. Again, that having been said, I have, to the best of my recollection, I have never seen one performed." *See*, Werner Deposition, 263:4–9.

[125] Werner Report, ¶ 96.

[126] Werner Report, ¶ 97.

[127] Werner Report, ¶ 97.

c. Using the regression model from his stock event study to compare "the frequency of statistically significant abnormal stock price reactions on news days to the frequency of statistically significant reactions on non-news days."[128]

d. Testing whether the frequency for the "news" days is statistically significantly higher than the "non-news" days.

84. To apply this test to the FXCM Notes, I have relied upon the same set of "unique days on which the Company filed an 8-K" that Dr. Werner has identified in his Exhibit 10 to identify the "news" days.[129] I also use the residual returns that Dr. Werner has calculated in his Notes event study in Exhibit 12 to his report. The inputs to the calculation are as follows:

a. There were 661 trading dates during the Putative Notes Class Period (June 24, 2014 to February 6, 2017).

b. During this period, there were 64 unique dates which FXCM filed an 8-K, which leaves 597 "non-news" days.

c. Of the 64 "news" days, there are eight for which there were consecutive trading days for Dr. Werner to calculate a Notes return, two of which have a statistically significant return using his Notes event study regression model.

d. Of the 597 "non-news" days, there are 60 for which Dr. Werner has calculated a return, eight of which have a statistically significant return.

85. As **Exhibit 4** shows, the frequency of statistically significant abnormal Notes price reactions on news days (two out of eight or 25%) is not statistically significantly different from

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[128] Werner Report, ¶ 102.

[129] Werner Report, ¶ 97. In selecting "news" days, I rely upon the "Effective Trading Date" from Dr. Werner's Exhibit 10, which could be different from the date on which an 8-K is filed, given the possibility that an 8-K could be released after market hours. Dr. Werner states "[t]here are several instances where the effective testing date for the 8-K event is different from the 8-K filing date." *See*, Werner Report, ¶ 99.

the frequency on non-news days (eight out of 60 or 13.3%).[130] For the equity, Dr. Werner tests whether the occurrence of statistically significant abnormal stock returns on a day is independent of that day being a "news" day (*i.e.*, whether "news" days are more likely to have statistically significant abnormal returns than "non-news" days).[131] When I applied the same test on the Notes, the results does *not* support the notion that statistically significant abnormal Notes returns are more likely to occur on "news" days than on "non-news" days.

86. Further, the infrequency of Notes trading on 8-K days raises additional issues that Dr. Werner fails to address. The FXCM Notes *did not trade at all* on 42 of the 64 unique dates during the period on which FXCM filed an 8-K, [132] which according to Dr. Werner are days with "events that contain a higher flow of information."[133] If the FXCM Notes traded in an efficient market, and these events provided new, value-relevant information, one would expect to see trading activity.

87. Dr. Werner does not address the lack of trading on the vast majority of 8-K dates. It is worth noting that he uses a one-day window in his event study to determine whether information is incorporated in to the price "quickly" for the FXCM Notes as well as the FXCM common stock. [134] When asked how "quickly" a security price typically takes to react to news, Dr.

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[130] Even though 25% is nominally different from 13.3%, one cannot say with a 95% degree of confidence that the difference is statistically significant and therefore unlikely to be attributed to random chance based on the result of the Fisher's Exact Test.

[131] Specifically, the test applied fails to reject the hypothesis that the "news" days are as likely as the "non-news" days to be associated with significant abnormal Notes returns. The specific test that Dr. Werner uses is a Fisher Exact test. Dr. Werner writes that "the [Fisher's Exact] test compares the frequency of statistically significant abnormal stock price reactions on news days to the frequency of statistically significant reactions on non-news days." *See,* Werner Report, ¶ 102. McQueen and Thorley (1991) write that "[t]he Fisher exact probability test determines whether two groups... differ in the proportion with which they fall into two classifications." McQueen, Grant and Steven Thorley. 1991. "Are Stock Returns Predictable? A Test Using Markov Chains." *The Journal of Finance* 46 (1): 239–263 at p. 260.

[132] The count of 42 does not include Monday, December 14, 2015, for which there was trading aftermarket on Friday, December 11, 2015. *See,* **Exhibit 5**.

[133] Werner Report, ¶ 97.

[134] Note also that Dr. Werner states that "a stock trades in an efficient market when all publicly available information is incorporated into the stock price and any new information that impacts the economic outlook of the firm gets

Werner agreed during his deposition that "normally what you would see would be within one day."[135] It is not clear how Dr. Werner can conclude that the market is "quickly" incorporating information into the price of the FXCM Notes if there is simply no FXCM Notes trading at all on a "news day."

88. Additionally, as **Exhibit 5** shows, the 42 8-K dates without FXCM Notes trading include six dates for which Dr. Werner found significant abnormal returns in his event study for the FXCM common stock. These dates represent examples where information that was presumably value-relevant was released so that the stock price moved in a statistically significant manner. However, no trading occurred on these six dates for the FXCM Notes. Dr. Werner does not even acknowledge these trading discrepancies between the FXCM common stock and the FXCM Notes, let alone attempt to explain them.

89. For example, after the markets closed on December 14, 2015, FXCM filed an 8-K in which it reported monthly trading volume metrics for November 2015, including that retail customer trading volume of $298 billion in November 2015 was 11% lower than October 2015 and 12% lower than November 2014, as well as that average retail customer trading volume per day of $14.2 billion in November 2015 was 7% lower than October 2015 and 15% lower than November 2014.[136] Following the release of this news, the price of FXCM's common stock fell by 17.84% the following day, which is statistically significant according to Dr. Werner's model.[137] The FXCM Notes, however, did not even trade on the following day. In fact, the return on the FXCM Notes from December 14, 2015 (*i.e.*, the last day with a trade before the

quickly reflected in its stock price." *See,* Werner Report, Appendix A, ¶ 1. However, he does not provide a definition of market efficiency for corporate bonds.

[135] Werner Deposition, 57:2–3.

[136] FXCM Inc., Form 8-K, December 11, 2015, filed December 14, 2015, Exhibit 99.2.

[137] Werner Report, Exhibit 7.

news) to December 17, 2015 (*i.e.*, the first trading day after the news) was a *positive* 8.19%.[138] These results suggest that even though the stock moved in a negative and statistically significant manner after the news release, the Notes had no reaction, or potentially the opposite reaction, to the news identified in the 8-K.

90. Similarly, after the markets closed on January 12, 2016, FXCM filed an 8-K in which it reported monthly trading volume metrics for December 2015, including that retail customer trading volume of $323 billion in December 2015 was 8% higher than November 2015 and 9% lower than December 2014, as well as that institutional customer trading volume of $36 billion in December 2015 was 12% lower than November 2015 and 51% lower than December 2014.[139] Following the release of this news, the price of FXCM's common stock fell by 17.94% the following day, January 13, 2016, which is statistically significant according to Dr. Werner's model.[140] The FXCM Notes, however, did not trade the following day, and actually did not trade again until January 20, 2016.

91. It is also worth noting that on December 15, 2015, and January 13, 2016, the FXCM Notes were trading below $71, which was substantially below the par.[141] While Dr. Werner asserts that the Notes price is not expected to always move when the stock price moves, academic studies have shown that corporate bonds tend to be more sensitive to company-specific financial information when the company becomes financially distressed and is trading well below par.[142] On both of these occasions, FXCM reported customer trading volume information,

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[138] The last trading before the news were two aftermarket trades on December 11, 2014, a Friday. The volume-weighted price of these trades was $63.00; the volume-weighted notes price on December 17, 2014 was $68.38. The return is presented on a logarithmic basis, consistent with Dr. Werner's Exhibit 7.
[139] FXCM Inc., Form 8-K, January 12, 2016, filed January 12, 2016, Exhibit 99.1.
[140] Werner Report, Exhibit 7.
[141] Werner Report Production Materials.
[142] *See e.g.*, "We also find that speculative grade bonds have a stronger reaction than investment grade bonds to bad news, consistent with earnings news having a larger effect on bond price quotes when default risk is high." *See* Defond, Mark L., and Jieying Zhang. 2013. "The Timeliness of the Bond Market Reaction to Bad Earnings News." *Contemporary Accounting Research*, 31 (3): 911–936 at p. 911.

and the news was associated with a statistically significant stock price decline. This suggests that this information could also be relevant for FXCM Notes investors to evaluate FXCM's financial prospects and financial conditions.[143] Dr. Werner admitted during his deposition that when the stock price reactions for the FXCM Notes and stock diverged, it is possible one of the securities was not traded in an efficient market.[144] But Dr. Warner does not explain why the presence of these differing price reactions by the FXCM Notes from that of the stock above is consistent with market efficiency.

D. Dr. Werner Also Makes Numerous Methodological Errors that Render His Event Study Analyses Unreliable

92. As I discuss in **Section IV.C.3** above, the results of Dr. Werner's event study, even if taken at face value, do not provide reliable evidence that the FXCM Notes traded in an efficient market throughout the Putative Notes Class Period. Further, Dr. Werner makes numerous methodological errors when implementing his event study which render his results unreliable.

93. As an initial matter, Dr. Werner makes a statistical error that causes him to overestimate the statistical significance of the return he attributes to February 7, 2017. Additionally, he is inconsistent in his choice of the time windows he uses to estimate the expected returns for FXCM's common stock and the FXCM Notes.

94. Dr. Werner also deviates from accepted practice in academic event studies by including "dummy" variables for each of the days on which FXCM filed an 8-K (as well as for January 16, 2015 through January 23, 2015), for a total of ten dummy variables out of 66 days included in his Notes event study.[145] The use of these dummy variables would cause Dr. Werner to understate normal FXCM Notes volatility and make it more likely that he would conclude that the FXCM Notes' return for a certain event is statistically significant. Finally, in his calculation of residual returns for the Notes, Dr. Werner uses the same variables he uses in the stock event study

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[143] Werner Report, Exhibit 9.
[144] "…so you're asking me, hypothetically, is it possible that if a stock and a bond for the same company moved in a different direction, that one of those securities was inefficient? It is possible." *See,* Werner Deposition, 70:7–12.
[145] Werner Report, Exhibit 11. *See also*, Werner Report, ¶ 77.

regression model to control for market movements for the FXCM Notes despite the fact that these factors explain returns for the FXCM Notes poorly. Dr. Werner also fails to account for factors typically controlled for in bond event studies such as changes to the level or term structure of interest rates. **Appendix C** describes these methodological deficiencies in detail.

V. Dr. Werner Has Failed to Propose a Class-wide Damages Methodology That Is Tied to Plaintiffs' Theory of Liability

95. I understand that Plaintiffs are not required to analyze loss causation or calculate per-share damages at the class certification stage. However, Plaintiffs are required to put forth a methodology for calculating damages on a class-wide basis and in a manner consistent with Plaintiffs' theory of liability. I also understand that Plaintiffs need to put forth a methodology that is capable of measuring price inflation attributable only to the allegedly misrepresented or omitted information given the specific facts and circumstances of the case. As described below, neither Plaintiffs nor Dr. Werner have proposed such a methodology.

96. Specifically, inflation at each point in time represents the difference between the actual security price at that time and the hypothetical price that would have prevailed absent the alleged fraud (*i.e.*, the "but-for" security price). To measure inflation, Plaintiffs must specify the information that Defendants should have disclosed at different points in time (*i.e.*, the "but-for" disclosure), and determine the value implications of the incremental information conveyed by the "but-for" disclosure.

97. Dr. Werner opines that "the finder of fact in this matter will be able to compute damages using a common class-wide methodology that applies to the calculation of damages for each and every Class member."[146] While he does not clearly articulate his proposed methodology, Dr.

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[146] Werner Report, ¶ 163.

Werner appears to indicate that he would use the residual price declines from an event study of the FXCM common stock and FXCM Notes following the alleged corrective disclosure to determine the price inflation.[147] This is typically referred to as a "back-casting" approach.

98. Here, Plaintiffs and Dr. Werner would face substantial challenges if they attempted to use a "back-casting" approach to measure inflation. Dr. Werner does not indicate how such a methodology could disentangle any price impact of "collateral consequences" that were revealed on February 6, 2017 (*i.e.*, FXCM's immediate exit of its U.S. business) from price inflation that could be attributed to the alleged misrepresentations and omissions. This issue is particularly relevant because, from an economics perspective, it is unclear (and Dr. Werner fails to explain) why the information about FXCM's past business dealings with Effex, a relationship that had been discontinued for more than two years and therefore had little, if any, bearing on FXCM's future cash flows, could have a value impact as of February 7, 2017. Further, given the various flaws in Dr. Werner's market efficiency analysis, he cannot demonstrate that the price decline in the FXCM Notes on February 7, 2017 can be used as a reliable measure of the value impact of information disclosed on the prior day. Finally, Dr. Werner does not provide any explanation regarding how his "back-casting" methodology can be used to measure inflation given the likely time varying nature of the alleged fraud and changes in FXCM's financial situation. Specifically, Dr. Werner offers no methodology to estimate how the stock and Notes price would have changed had FXCM revealed the alleged "truth" regarding its trading platform and relationship with Effex at the beginning of, or during, the Putative Class Period. Given the challenges presented in this case, Dr. Werner fails to show that there is a reliable methodology for calculating damages in a manner that is consistent with Plaintiffs' theory of liability.

A. Dr. Werner Fails to Explain How His Generic Damages Approach Can Disentangle the Effect of the Allegedly Corrective Information Regarding

[147] Werner Report, ¶ 159.

FXCM's "No Dealing Desk" from Regulatory and Other Collateral Consequences in Order to Measure Inflation

99. In this section I discuss that given the fact pattern in this case Dr. Werner needs to propose a methodology that is capable of disentangling the price impact of multiple pieces of information that were disclosed simultaneously on the alleged corrective disclosure day, which is something an event study as employed by Dr. Werner cannot always do. I also discuss that it is not clear that the alleged corrective information alone, absent the "collateral consequences" that were disclosed contemporaneously, would have been value-relevant to investors as of February 7, 2017. This means "back-casting" the residual price decline following the alleged corrective disclosure would be unreliable and could vastly overestimate inflation.

1. Dr. Werner's Methodology Needs to Be Capable of Disentangling the Impact of Multiple Pieces of Information in Order to Measure Inflation

100. Given the fact pattern in this case, any methodology Dr. Werner proposes needs to be capable of disentangling the price impact of multiple pieces of information. This is because the information released on the alleged corrective disclosure day included confounding information in the form of "collateral consequences," whose price impact may not represent the removal of inflation from an economic perspective.

101. Collateral consequences often refer to the impact on the firm's future cash flows that are associated with the alleged corrective disclosure, but that one would not have expected to occur under an earlier, "but-for" disclosure made by the firm. Examples of collateral consequences include regulatory penalties, concerns over corporate governance, and business disruptions. Information about these collateral consequences on the alleged corrective disclosure day can

cause a negative stock price reaction even if there is no prior inflation in the security price.[148] Therefore, from an economics perspective, Dr. Werner fails to explain why price reactions to these collateral consequences can be attributable to the removal of alleged inflation from the security price, and can be used in calculating damages.

102. In this matter, the price reaction on the alleged corrective disclosure day includes that of collateral consequences. In particular, the CFTC order on February 6, 2017 supposedly revealed that "FXCM had an undisclosed interest in the market maker that consistently 'won' the largest share of FXCM's trading volume."[149] However, the CFTC order also contains additional information related to the regulatory penalty and settlement with FXCM, including FXCM's withdrawal from its business from the U.S.[150] These settlement terms altered FXCM's business and financial prospects substantially as FXCM was forced to sell its U.S. business immediately, which was viewed negatively by certain analysts.[151,152]

103. Dr. Werner does not propose a methodology to disentangle the price impact of the information about FXCM's prior NDD platform and its relationship with Effex from the terms of

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[148] As a stylized example, suppose a company misstates to investors that it owns a diamond mine worth $200 million instead of a gold mine with the same value. Had the company announced the corrective information earlier, the value of the company would not have changed, *i.e.*, there is *no inflation,* assuming diamond and gold prices stayed the same. However, when a corrective disclosure is released, the stock price could still decline due to concerns over its internal controls or management competence.

[149] Order Instituting Proceedings Pursuant to Sections 6(c) and 6(d) of the Commodity Exchange Act, Making Findings, and Imposing Remedial Sanctions, *In the Matter of Forex Capital Markets, LLC, FXCM Holdings, LLC, Dror Niv, and William Ahdout*, February 6, 2017 ("CFTC Order"), Section III.A.

[150] The settlement terms included that FXCM would "not accept new customer accounts" and that the Company would "withdraw from registration with the Commission in all capacities…" *See*, CFTC Order, Section VII.C1–3.b.

[151] On February 7, 2017, FXCM disclosed that it had signed a non-binding letter of intent with GAIN Capital Holdings Inc. to sell FXCM's U.S. customer accounts for an undisclosed amount. *See*, FXCM Inc., Form 8-K, filed February 7, 2017, Exhibit 99.1.

[152] An analyst from Cowen & Company discussed the negative consequence of the settlement on the Company's financial prospects and solvency, noting: "as a financial services company, it is certainly not a good thing for their ongoing foreign operations that they were pretty much forced out of the U.S. and that their debt and equity prices put parent level solvency into question." *See*, "FXCM Settles 'With Regulators, Plans to Exit US. Business," *Cowen*, February 7, 2017.

the settlement.[153] Rather, he merely asserts that he would "control[] for potentially confounding non-fraud related information" in an unspecified way in the future.[154] He therefore does not show that a methodology exists to disentangle the price reactions correcting prior inflation (if any) from the price movements that reflect collateral consequences that do not correct prior inflation.

2. It is Not Clear that the Allegedly Corrective Information, Absent the Collateral Consequences, Would Be Value Relevant to Investors

104. Dr. Werner also has not addressed the possibility that the information revealed to the market on February 6, 2017 regarding the Company's historical NDD platform and its past relationship with Effex might not be value-relevant to investors in the absence of any impact on FXCM's *future* cash flows. This further suggests that one cannot simply rely on the price reaction on the alleged corrective disclosure day to measure inflation, and Dr. Werner has provided no alternative approach to resolve this issue.

105. A piece of information is value-relevant if it has an impact on the present value of the future cash flows of a company.[155] The price reaction to a piece of information hence reflects how that information changes either stockholders' or Notes holders' assessment of *future* cash flows that they will likely receive.

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[153] A daily event study, if properly conducted, can be used to measure a security's price reaction to the totality of firm specific information released on a given date. Dr. Werner does not show that an event study like the one he employs in and of itself can disentangle the price impact of each individual piece of information when multiple pieces of information are revealed simultaneously. Using an intraday event study would not remedy this issue given the multiple pieces of information revealed on the alleged corrective disclosure day were released at the exact same time.
[154] Werner Report, ¶ 159.i.
[155] "In finance the value of the firm is its ability to generate financial cash flow….One way to think about the question of how much a firm is worth is to calculate the present value of its future cash flows." *See*, Ross, Stephen A. et al. 2003. *Corporate Finance.* 6th Edition. McGraw-Hill Irwin, pp. 28, 94.

106. Dr. Werner fails to acknowledge that a disclosure related to a *past* business relationship would not necessarily have an impact on FXCM's *future* cash flows. The Opinion on Motion to Dismiss notes that FXCM's "order flow arrangement [with Effex] came to a halt" in August 2014.[156] The Company further disclosed to the public that it no longer received payments for order flow in November 2014.[157] If the "order flow arrangement" between FXCM and Effex ended in 2014, one would not expect, and Dr. Werner fails to show, that its disclosure would have future cash flow implications for FXCM or a security price impact as of February 7, 2017.

107. Dr. Werner also does not explain that had FXCM revealed the alleged "truth" about its NDD and its relationship with Effex earlier in the Putative Class Period, such a disclosure would necessarily have negative value implications for investors. Indeed, some analysts viewed the agency model as one of the contributing factors to why FXCM experienced such a large and adverse impact as a result of the SNB Flash Crash in January 2015.[158] Additionally, FXCM switched in March 2015 from a purely agency model to a "hybrid" model which included a

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[156] Opinion & Order Class Action, *In re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*, March 28, 2019 ("Opinion on Motion to Dismiss"), p. 21. The Company also disclosed publicly that it had discontinued payments for order flows by Q3, 2014. *See*, "Final Transcript: Q3 2014 FXCM Inc Earnings Call," FXCM Inc., November 6, 2014.

[157] "Beginning in August 2014, we no longer receive payments for order flow." *See*, FXCM Inc., Form 10-Q, for Quarterly Period Ended September 30, 2014, filed November 7, 2014, p. 45.

[158] "Thoughts on Leucadia and the Capital Infusion--Lowering TP and 2015 Estimates," *Credit Suisse*, January 20, 2015, p. 6.

"dealing desk" for some retail customers.[159] This diversification away from a purely "no dealing desk" business model in March 2015 was viewed positively by analysts.[160,161]

108. Dr. Werner fails to explain whether a model exists that can assess such a complex issue concerning the value implications of FXCM's NDD platform and its relationship with Effex in his generic damages framework.

B. Dr. Werner Has Not Demonstrated that an Event Study Based on the FXCM Security Price Movements on February 7, 2017 Could Provide a Reliable Measure of the Value Impact of Information Revealed on that Day

109. Dr. Werner does not address whether the markets for FXCM's common stock and the FXCM Notes were efficient in such a way that the residual returns from an event study on the alleged corrective disclosure date can be used to reliably measure inflation. This is particularly relevant for the FXCM Notes given, as discussed above in **Section IV**, Dr. Werner's market efficiency analysis for the FXCM Notes is flawed, deficient, and biased.

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[159] "To do this, we have three principal objectives: … launch a dealing desk model for small and retail customers to increase our dollar per million yield." *See*, "Final Transcript: Q4 2014 FXCM Inc Earnings Call," FXCM, Inc., March 12, 2015; *see also*, "Focused on the Opportunity Set Available," *Barclays*, March 13, 2015, p. 3.

[160] Barclays commented: "the company will launch a hybrid desk model (option to trade on principal basis) for small retail customers with less than $20k in deposits. FXCM hopes to retain and gain market share in this important (though small) portion of their client base as they were the quickest to recover post the January 15 event. As smaller clients represent lower risk for FXCM in the principal model, this initiative is expected to contribute to the company's capture rate and profitability." *See*, "Focused on the Opportunity Set Available," *Barclays*, March 13, 2015, p. 3. Credit Suisse also stated: "they will transition to a hybrid dealing desk model for clients with account balances lower than $20,000, which will allow them to offer greater leverage to such clients and retain this small but profitable client segment. It should be noted this is a reversal from the firm's previous strategy both to operate a pure agency model and focus on clients with larger account balances." *See*, "4Q14 Results and Business Update; Lowering TP," *Credit Suisse*, March 13, 2015, p. 3 (emphasis omitted).

[161] Note that I do not suggest that the principal risk FXCM took in small retail trades after March 2015 was equivalent or similar to that in its arrangement with Effex. I use this example to illustrate that the value implication of a "but-for" disclosure regarding FXCM's NDD model is complex to analyze and that Dr. Werner has failed to put forth any methodology to address this issue.

110. First, Dr. Werner's market efficiency analysis does not demonstrate that the markets for FXCM securities were efficient during the Putative Class Period *with respect to the type of information allegedly misrepresented* (*i.e*., the agency model or relationship with a liquidity provider). For example, if the market fails to react to certain type of information rapidly and fully, then the residual returns from an event study following the release of the information will not be instructive to measure the value impact of that information.

111. Second, Dr. Werner's assessment of market efficiency, for both the stock and Notes, completely ignores the question of whether information is incorporated *fully*.[162,163] Unless the new information is incorporated *fully* in the security price (*i.e*., no further price reactions in the same or the opposite direction), the security return during the event window might underestimate or overestimate the value impact of the new information. During his deposition, Dr. Werner conceded that it is possible for a security to underreact or overreact to news.[164] As such, Dr. Werner does not demonstrate that the residual return within the event window used in his event study model (*e.g*., the trading on February 7, 2017) can be used as an unbiased, reliable measure of the value impact of the allegedly corrective information. Instead, the price reaction could have overestimated the value impact of the allegedly corrective information,[165] and, if used to measure damages, could cause Plaintiffs to receive a windfall.

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[162] Dr. Werner's definition of market efficiency only discusses speed of reaction: "any new information that impacts the economic outlook of the firm gets quickly reflected in its stock price." *See*, Werner Report, Appendix A, ¶ 1.

[163] Dr. Werner conducts no test to determine whether new information was fully incorporated into the prices of the FXCM securities during his event windows, such that, for example, the price did not continue to react to the same news on the following days or weeks, or that the price did not overreact initially and then rebound on the following days or weeks. Crucially, his "news no-news" test is incapable of providing such evidence. Such a test merely examines if volatility on "news" days is greater than on "non-news" days. *See*, Fama, Eugene F. 1991. "Efficient Capital Markets: II," *The Journal of Finance*, 46 (5): 1575–1617, at p. 1586.

[164] Werner Deposition, 65:16-17 ("A. … can a stock overreact to news or underreact to news? Yeah, it's possible.")

[165] As De Bondt and Thaler (1985) note, "people tend to overreact to unexpected and dramatic new events." *See*, De Bondt, Werner F. M. and Richard Thaler. 1985. "Does the Stock Market Overreact?" *The Journal of Finance* 40 (3): 793–805 at p. 793.

C. Dr. Werner's Proposed Methodology Fails to Account for Potential Changing Inflation Across the Putative Class Period

112. As discussed above, Dr. Werner does not explain why, had FXCM revealed the alleged "truth" earlier in the Putative Class Period, such a disclosure would necessarily have negative value implications for investors (*i.e.*, why securities' prices were necessarily inflated). Even assuming prices were inflated, Dr. Werner does not demonstrate how a damages methodology based on an event study would be able to account for the likely changes in inflation during the Putative Class Period. A well-designed event study can be used to measure the security price reaction to value relevant company-specific information released at a given point in time. However, such a study is uninformative regarding the value of that same set of information on a different date, let alone the impact of different information. For the sake of argument, even if Dr. Werner's methodology could accurately capture the value impact of alleged corrective information on February 7, 2017, he has not shown there is a reliable approach to measure inflation that could have varied over time during the Putative Class Period.

113. First, the information FXCM allegedly could have disclosed changed over time, as its relationship with Effex evolved. As discussed previously, FXCM's "order flow arrangement [with Effex] came to a halt" in August 2014.[166] A disclosure before, versus after, August 2014 about FXCM's relationship with Effex could have been different, and in turn could have different value implications.[167]

114. Second, FXCM's financial situation changed substantially during the Putative Class Period, which is of particular importance for the FXCM Notes. This is because the FXCM

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[166] Opinion on Motion to Dismiss, p. 21 ("The Court agrees with Defendants, however, that Plaintiffs have failed to plead that the Company's allegedly problematic relationship with Effex persisted past August 2014, when their order flow arrangement came to a halt."). *See also*, CFTC Order, Section III.C.5.

[167] "[T]hrough HFT Co's monthly payments from 2010 through 2014, HFT Co rebated to FXCM approximately $77 million of the trading revenue HFT Co achieved." *See*, CFTC Order, Section III.C.5.

Notes' price sensitivity to information would depend on the firm's financial strength. Specifically, when a firm is financially healthy and the likelihood of default is remote, bondholders are expected to receive pre-specified interest and principal amounts and therefore the prices of that firm's bonds will be relatively insensitive to firm specific news.[168]

115. On June 24, 2014, when the FXCM Notes started trading, FXCM's equity market capitalization was approximately $645 million and the Notes were trading at approximately par.[169] At the end of the Putative Class Period on February 6, 2017, FXCM's equity market capitalization was approximately $38 million and the Notes were trading below $50, substantially below par.[170] Further, the Company's capital and ownership structure changed drastically after the SNB Flash Crash in January 2015 and the resulting loan agreement with Leucadia.[171] Given these changes in FXCM's financial situation, even for the same disclosure, the value implications of that disclosure would vary for the FXCM securities, especially the Notes.

Finally, I have explained from an economic perspective why price reactions to "collateral consequences" may not represent removal of inflation. If Plaintiffs argue that they should be included in the damages calculation, such price impact would likely change over time.[172] The terms of the settlement with the CFTC could have been different if the disclosure came at a

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[168] In contrast, when a company is financially distressed, creditors are more exposed to potential losses, and the bond will likely trade below par, reflecting the possibility of investors not being repaid in full. In this type of scenario, the price of a bond will be more sensitive to firm specific information, given such information could directly impact likely recovery of bond holders.

[169] Werner Report, Exhibit 7.

[170] The last trades before February 6, 2017 were two trades reported in the TRACE data on January 26, 2017, a buy at $47 and a sell at $47.5.

[171] The deal with Leucadia included a $300 million senior secured term loan with a 10% coupon, a $10 million deferred financing fee, "stringent rules about the distribution of proceeds from the sale of assets or the company as a whole, as well the right to request the sale of the firm at the highest reasonable price after three years." *See*, "Thoughts on Leucadia and the Capital Infusion--Lowering TP and 2015 Estimates," *Credit Suisse*, January 20, 2015, p. 1.

[172] As discussed earlier, my understanding is that price impact attributed to "collateral consequences" should not be included in damages.

different time.[173] Further, even assuming the CFTC settlement terms would have been the same regardless of the timing of the disclosure, the impact on FXCM's business would have been different, given that one of the collateral consequences was the effective ban of FXCM from operating in the U.S. and FXCM's revenue from the U.S. changed over time.[174]

Executed this 12th of June, 2020

Terrence J Hendershott

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[173] To the extent that the regulator's enforcement focus shifted during the Putative Class Period or it weighed duration of the purported offence as an important factor, the ultimate outcome of the CFTC Order might have been different if the "but-for" disclosure was made at the beginning of the Putative Class Period.

[174] For the year ended December 31, 2013, approximately $3,551.4 billion of FXCM's retail trading volume came from customers residing outside of the United States while $516.6 billion of retail trading volume came from customers residing inside the United States. For the year ended December 31, 2016, those retail volume numbers were $2,896.5 billion for customers residing outside of the United States and $644.5 billion for customers inside the United States. *See*, FXCM Inc., Form 10-K for Fiscal Year Ended December 31, 2013, filed March 17, 2014, pp. 1, 46; *see also*, FXCM Inc., Form 10-K for Fiscal Year Ended December 31, 2016, filed March 20, 2017, pp. 1, 52.

APPENDIX A

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Publications

- Does Financial Market Structure Impact the Cost of Raising Capital? (with James Brugler and Carole Comerton-Forde), forthcoming *Journal of Financial and Quantitative Analysis*.
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- Call for Papers—Special Issue of Information Systems Research Fintech – Innovating the Financial Industry Through Emerging Information Technologies (with Michael Zhang, Leon Zhao, and Eric Zheng), *Information Systems Research* (December 2017), 885-886.
- Automated Trading, *Encyclopedia of Quantitative Finance*.
- Preface to the Focus Theme Section: 'Financial Market Engineering' (with Dirk Neumann, Robert Schwartz, Bruce Weber, and Christof Weinhardt), *Electronic Markets* 16 (May 2006), 98-100.
- An Economic View of Information Systems (with Krishnan Anand), Introduction to Special Issue on Information Systems and Economics, *Decision Support Systems* 41(May 2006), 683-687.
- Wall St's appeal for new rules is not altruistic, *Financial Times*, comment/op-ed, 7/21/2004, p. 13.
- Should the Outcome of a Coin Flip Mean So Much in NFL Overtime? Bid for the Ball (with Jonathan Berk), *Wall Street Journal Online*, 12/22/2003.

Honors, Awards, Miscellaneous

- Willis H. Booth Chair in Banking and Finance, Haas School of Business, UC Berkeley (2017-)
- Norwegian Finance Initiative Grant to study the effect of technological and regulatory changes on market structure and transparency across equity and fixed-income markets in the US and Europe (2018-2021)
- Digging into Data Round 4; Digging Into High Frequency Data: Present And Future Risks And Opportunities (2016-2020)
- Cheryl and Christian Valentine Chair, Haas School of Business, UC Berkeley (2012-2017)
- Distinguished Visiting Scholar, Securities and Exchange Commission (2015).
- Michael J. Brennan Best Paper Award for best paper published in *Review of Financial Studies* in 2014.
- *Financial Review* Outstanding Publication Award for 2014.
- 2013 Philip Brown Prize.
- Barbara and Gerson Bakar Faculty Fellow, Haas School of Business, UC Berkeley (2011-2012)
- Visiting Scholar, University of Sydney (2010)
- Net Institute Grant (2009)
- Kauffman Foundation Entrepreneurship & Innovation Research Grant (2008-2009)
- New York Stock Exchange Euronext Award for best paper on equity trading, Western Finance Association (2008)
- Visiting Fellow, The Paul Woolley Centre for the Study of Capital Market Dysfunctionality, London School of Economics (2008)
- Nasdaq Award for best paper on market microstructure, Financial Management Association (2007)
- Visiting Professor, Université Paris-Dauphine (2007, 2008, 2009, 2010, 2012, 2013)
- Nasdaq Economic Advisory Board, (2004-7; Chair 2007)
- Visiting Economist, New York Stock Exchange (2005-2006)
- National Science Foundation Grant #0133848, CAREER: Electronic Trading Systems (2002-2006)
- Schwabacher Fellow (outstanding teaching and research), University of California, Berkeley (2005-2006)
- Junior Faculty Research Grant, Committee on Research, University of California, Berkeley (2001, 2003)
- New York Stock Exchange Award for best paper on equity trading, Western Finance Association (2001)
- Simon School Teaching Honor Roll, University of Rochester (2000, 2001)
- Xerox Assistant Professor, University of Rochester (1999-2001)
- Frye Fellowship, Stanford University (1992)
- Chiles Fellowship, Stanford University (1991)

Teaching Experience

- High-Frequency Finance (MFE 230X), UC Berkeley.
- Introduction to Business Analytics (UGBA 104), UC, Berkeley.
- Information Technology Strategy (MBA 247B, ENGIN 298A, INFOSYS 290, UGBA 196), UC, Berkeley.
- Operations Management (MBA and EWMBA 204), UC, Berkeley.

- Financial Information Systems (CIS 446/Finance 446), University of Rochester.
- Investment Management and Trading Strategies (Finance 434), Simon School, University of Rochester.

Professional Service

Editorial:

- Associate Editor, *Journal of Financial Markets*, 2012-
- Associate Editor, *Management Science*, 2010- 2018
- Associate Editor, *Journal of Banking & Finance*, 2015-2016
- Co-Editor, *Journal of Economics and Management Strategy*, 2006-2013
- Associate Editor, *Information Systems Research*, 2004-5
- Associate Editor, *Decision Support Systems*, 2003-2016
- Advisory Editor, *Handbooks in Information Systems*, Elsevier
- Guest Editor, Special Issue on Behavioral Finance and Recent Developments in Capital Markets, *Pacific-Basin Finance Journal*
- Guest Editor, Focus Theme Section: 'Financial Market Engineering', *Electronic Markets*
- Guest Editor, Special Issue on Information Systems and Economics, *Decision Support Systems*

Conferences:

- Western Finance Association, program committee, 2011-
- Napa Conference on Financial Markets, program committee, 2009-2017
- European Finance Association, program committee, 2001-2004, 2012-2016
- French Finance Association Paris December Conference, 2013-
- Finance Down Under Conference, 2013-2016
- Society for Financial Econometrics and Tinbergen University (Amsterdam) Conference on Measuring and Understanding Asset Price Changes: The Price of Liquidity, and the Liquidity of Price, program committee, 2011
- NYSE-Euronext/Dauphine University, 3rd Workshop on Financial Market Quality, organizer, 2010
- NYSE Euronext & Tinbergen Institute Workshop on Liquidity and Volatility, program committee, 2009
- National Institute of Securities Markets Conference on Structure, Microstructure and Regulation of Securities Markets, Mumbai, India, program committee, 2008
- NYSE-Euronext/Dauphine University, 2nd Workshop on Financial Market Quality, organizer, 2008
- INFORMS Conference on Information Systems and Technology, program committee, 2000-6
- Microstructure of International Financial Markets, Hyderabad, India, program committee, 2006
- FinanceCom (International Workshop on Finance Industry Enterprise, Applications & Services), program committee, 2005-2012

Prior Testimony

(Past four years)

Administrative Proceeding Testimony (2015), *In the Matter of the Application of Securities Industry and Financial Markets Association for Review of Actions Taken by Self-Regulatory Organizations*, Administrative Proceeding File No. 3-15350 (Securities and Exchange Commission).

Deposition Testimony (2016), *Strougo v. Barclays PLC, et al.*, Case No. 1:14-cv-05797 (U.S. District Court Southern District of New York).

Deposition Testimony (2017), *In re Allergan, Inc. Proxy Violation Securities Litigation*, Case No. 8:14-cv-2004-DOC (U.S. District Court Central District of California, Southern Division).

Deposition and Trial Testimony (2017, 2018, 2019), *SEC v. Lek Securities Corp, et al.*, Case No. 17-cv-1789 (U.S. District Court Southern District of New York).

Deposition Testimony (2018), *Axiom Investment Advisors, LLC et al., v. Deutsche Bank AG*, Case No. 1:15-cv-09945 (U.S. District Court Southern District of New York).

Deposition Testimony (2018), *In re The Bank of New York Mellon ADR FX Litigation*, Case No. 16-cv-00212 (U.S. District Court Southern District of New York).

Deposition Testimony (2018), *Carver, et al., v. The Bank of New York Mellon, et al.*, Case No. 15-cv-10180 (U.S. District Court Southern District of New York).

Deposition Testimony (2018, 2019), Covered business method reviews, Patent numbers 6,618,707, 7,246,093, 7,599,875, 7,921,051, 8,386,371, Patent and Trademark Office.

Deposition Testimony (2019), *Emily and Malcom Fairbairn v. Fidelity Investments Charitable Gift Fund*, Case No. 3:18-cv-04881 (U.S. District Court Northern District of California).

APPENDIX B

Documents Considered[1]
Expert Report of Terrence Hendershott, Ph.D

Title	Date
Pleadings and Legal Documents	
Cammer v. Bloom , 711 F. Supp 1264 (D.N.J. 1989)	April 19, 1989
Elmer Krogman v. R. Dale Sterritt, Jr. , LEXSEE 202 F.R.D. 467 (2001)	March 30, 2001
Memorandum of Law in Support of Amended Motion for Class Certification and Appointment of Class Representatives and Class Counsel, *In Re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*	April 9, 2020
Opinion & Order Class Action, *In re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*	March 28, 2019
Order Instituting Proceedings Pursuant to Sections 6(c) and 6(d) of the Commodity Exchange Act, Making Findings, and Imposing Remedial Sanctions, *In the Matter of Forex Capital Markets, LLC, FXCM Holdings, LLC, Dror Niv, and William Ahdout*	February 6, 2017
Second Amended Consolidated Securities Class Action Complaint, *In re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*	April 6, 2018
Third Amended Consolidated Securities Class Action Complaint, *In re Global Brokerage, Inc. f/k/a FXCM Inc. Securities Litigation*	April 17, 2020
SEC Filings	
FXCM Inc., Form 10-K for Fiscal Year Ended December 31, 2013	March 17, 2014
FXCM Inc., Form 10-Q, for Quarterly Period Ended September 30, 2014	November 7, 2014
FXCM Inc., Form 8-K, December 11, 2015	December 14, 2015
FXCM Inc., Form 8-K, January 12, 2016	January 12, 2016
FXCM Inc., Form 8-K, February 2, 2017	February 7, 2017
FXCM Inc., Form 10-K for Fiscal Year Ended December 31, 2016	March 20, 2017
Depositions	
Deposition of Adam Werner, Ph.D.	February 28, 2020
Remote Video Deposition of Joseph S. Patt	April 23, 2020
Publicly Available Sources	
"Fast Answers: Market Maker," *U.S. Securities and Exchange Commission* , https://www.sec.gov/fast-answers/answersmktmakerhtm.html	March 17, 2000
FINRA Press Release, "FINRA Brings 144A Corporate Debt Transactions Into the Light"	June 30, 2014
"FX Broker FXCM Gets Rescue from Jefferies Parent Leucadia," *Reuters* , https://www.reuters.com/article/us-swiss-snb-fxcm/fx-broker-fxcm-gets-rescue-from-jefferies-parent-leucadia-idUSKBN0KP1MY20150117, accessed April 24, 2020	January 16, 2015
"MarketAxess Investor FAQs," MarketAxess, https://investor.marketaxess.com/investor-faqs	
"Regulation NMS," Securities Act Release No. 34-51808	June 9, 2005
Expert Reports	
Corrected Expert Report of Dr. Adam Werner and supporting materials	January 10, 2020
Analyst Reports	
"4Q14 Results and Business Update; Lowering TP," *Credit Suisse*	March 13, 2015
"Focused on the Opportunity Set Available," *Barclays*	March 13, 2015
"FXCM Settles with Regulators, Plans to Exit U.S. Business," *Cowen*	February 7, 2017
"Solid 3Q; 4Q Starting Even Stronger; Pricing Commentary Should Not Come As a Surprise," *UBS*	November 7, 2014
"Thoughts on Leucadia and the Capital Infusion--Lowering TP and 2015 Estimates," *Credit Suisse*	January 20, 2015
"Transforming the Business Model: A Focus on Larger, More Active Accounts," *Sandler O'Neill + Partners*	November 7, 2014
Textbooks	
Fama, Eugene F. *Foundations of Finance: Portfolio Decisions and Securities Prices* . Basic Books: New York	1976
Greene, William H. *Econometric Analysis* . Upper Saddle River, NJ: Prentice Hall	2002
Hull, John C. *Options, Futures, and Other Derivatives* . Upper Saddle River, New Jersey: Prentice Hall	2009
Ross, Stephen A. et al. *Corporate Finance* . 6th Edition. McGraw-Hill	2003
Shiller, Robert. *Irrational Exuberance* . Princeton, NJ: Princeton University Press	2000
Stock, James H., and Mark W. Watson. *Introduction to Econometrics.* 3rd edition. Addison Wesley Longman	2011

APPENDIX B

Documents Considered[1]
Expert Report of Terrence Hendershott, Ph.D

Title	Date
Academic Literature	
Aboody, David. "Recognition versus Disclosure in the Oil and Gas Industry." *Journal of Accounting Research* 34: 21–32	1996
Acharya, Viral and Alberto Bisin. "Counterparty Risk Externality: Centralized Versus Over-The-Counter Markets." *Journal of Economic Theory* 149: 153–182	2014
Amihud, Yakov and Haim Mendelson. "Trading Mechanisms and Stock Returns: An Empirical Investigation." *The Journal of Finance* 42 (3): 533–553	1987
Barber, Brad M. et al. "The Fraud-on-the-Market Theory and the Indicators of Common Stocks' Efficiency." *The Journal of Corporation Law* (Winter): 285–312	1994
Bernard, Victor L. and Jacob K. Thomas. "Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium?" *Journal of Accounting Research* 27: 1–36	1989
Bessembinder, Hendr k and William Maxwell. "Markets: Transparency and the Corporate Bond Market." *The Journal of Economic Perspectives* 22 (2): 217–234	2008
Bessembinder, Hendr k et al. "Measuring Abnormal Bond Performance," *The Review of Financial Studies* 22 (10): 4219–4258	2009
Bessembinder, Hendr k et al. "Capital Commitment and Illiquidity in Corporate Bonds." *The Journal of Finance* 73 (4): 1615–1661	2018
Bloomfield, Robert and Maureen O'Hara. "Market Transparency: Who Wins and Who Loses?" *The Review of Financial Studies* 12 (1): 5–35	1999
Boehmer, Ekkehart et al. "Lifting the Veil: An Analysis of Pre-Trade Transparency at the NYSE." *The Journal of Finance* 60 (2): 783–815	2005
Brogaard, Jonathan et al. "High frequency trading and extreme price movements." *Journal of Financial Economics* 128: 253–265	2018
Chaplinsky, Susan and Latha Ramchand. "The Impact of SEC Rule 144A on Corporate Debt Issuance by International Firms." *The Journal of Business* 77 (4): 1073–1098	2004
Chordia, Tarun et al. "Liquidity and market efficiency." *Journal of Financial Economics* 87 (2): 249–268	2008
Cochrane, John H. "Asset Pricing: Liquidity, Trading, and Asset Prices." *NBER Reporter* (Winter 2004/5): 1–12	2004/5
Cohen, Lauren and Dong Lou. "Complicated firms." *Journal of Financial Economics* 104 (2): 383–400	2012
D'Avolio, Gene. "The market for borrowing stock." *Journal of Financial Economics* 66 (2): 271–306	2002
Daniel, Kent et al. "Investor psychology in capital markets: evidence and policy implications." *Journal of Monetary Economics* 49 (1): 139–209	2002
De Bondt, Werner F. M., and Richard Thaler. "Does the Stock Market Overreact?" *The Journal of Finance* 40 (3): 793–805	1984
Defond, Mark L., and Jieying Zhang. "The Timeliness of the Bond Market Reaction to Bad Earnings News." *Contemporary Accounting Research* 31 (3): 911–936	2014
Di Maggio et al. "The value of trading relations in turbulent times." *Journal of Financial Economics* 124 (2): 266–284	2017
Dick-Nielsen et al. "Corporate Bond Liquidity before and after the Onset of the Subprime Crisis." *Journal of Financial Economics* 103: 471–492	2012
Dick-Nielsen, Jens. "Liquidity Biases in TRACE." *The Journal of Fixed Income* 19 (2): 43–55	2009
Dick-Nielsen, Jens and Marco Rossi. "The Cost of Immediacy for Corporate Bonds." *The Review of Financial Studies* 32 (1): 1–41	2019
Edwards, Amy K. et al. "Corporate Bonds Market Transaction Costs and Transparency." *Journal of Finance* 62 (3): 1421–1451	2007
Elton, Edwin J., and T. Clifton Green. "Tax and Liquidity Effects in Pricing Government Bonds." *The Journal of Finance* 53 (5): 1533–1562	1998

Documents Considered[1]
Expert Report of Terrence Hendershott, Ph.D

Title	Date
Elton, Edwin J. et al. "Fundamental Economic Variables, Expected Returns, and Bond Fund Performance." *The Journal of Finance* 50 (4): 1229–1256	1995
Fama, Eugene F. "Efficient Capital Markets: A Review of Theory and Empirical Work." *The Journal of Finance* 25 (2): 383–417	1970
Fama, Eugene F. "Efficient Capital Markets: II," *The Journal of Finance* 46 (5): 1575–1617	1991
Fama, Eugene F. and Kenneth R. French. "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33 (1): 3–56	1993
Feldhütter, Peter. "The Same Bond at Different Prices: Identifying Search Frictions and Selling Pressures." *The Review of Financial Studies* 25 (4): 1155–1206	2012
Ferrillo, Paul A. et al. "The 'Less Than' Efficient Capital Markets Hypothesis: Requiring More Proof from Plaintiffs in Fraud-on-the-Market Cases." *St. John's Law Review* 78 (1): 81–129	2004
Gi bert, Thomas et al. "Investor Inattention and the Market Impact of Summary Statistics." *Management Science* 58 (2): 336–350	2012
Grossman , Stanford J. and Joeseph E. Stiglitz. "On the Impossibility of Informationally Efficient Markets." *The American Economic Review* 70 (3): 393–408	1980
Hendershott, Terrence and Ananth Madhavan. "Click or Call? Auction versus Seach in the Over-the-Counter Market." *Journal of Finance* 70(1): 419–447	2015
Hirshleifer, David et al. "Driven to Distraction: Extraneous Events and Underreaction to Earnings News." *Journal of Finance* 64 (5): 2289–2325	2009
Hong, Harrison and Jeremy C. Stein. "Disagreement and the Stock Market." *Journal of Economic Perspectives* 21 (2): 109–128	2007
Huberman, Gur and Tomer Regev. "Contagious Speculation and a Cure for Cancer: A Nonevent that Made Stock Prices Soar." *The Journal of Finance* 56 (1): 387–396	2001
Lamont, Owen A. and Richard H. Thaler. "Can the Market Add and Subtract? Mispricing in Tech Stock Carve-Outs." *Journal of Political Economy* 111 (2): 227–268	2003
Lamont, Owen A. and Richard H. Thaler. "Anomalies: The Law of One Price in Financial Markets." *Journal of Economic Perspectives* 17(4): 191–202	2003
Li, Dan and Norman Schürhoff. "Dealer Networks." *The Journal of Finance* 74 (1): 91–144	2019
Liu, Weimin. "A liquidity-augmented capital asset pricing model." *Journal of Financial Economics* 82 (3): 631–671	2006
Livingston, Miles and Lei Zhou. "The Impact of Rule 144A Debt Offerings Upon Bond Yields and Underwriter Fees." *Financial Management* (Winter 2002): 5–27	2002
MacKinlay, A. Craig. "Event Studies in Economics and Finance." *Journal of Economic Literature* 35 (1): 13–39	1997
McQueen, Grant and Steven Thorley. "Are Stock Returns Predictable? A Test Using Markov Chains." *The Journal of Finance* 46 (1): 239–263	1991
Mitchell, Mark et al. "Limited Arbitrage in Equity Markets." *The Journal of Finance* 57 (2): 551–584	2002
Officer, R. R. "The Distr bution of Stock Returns." *Journal of the American Statistical Association* 67 (340): 807–812	1972
Shleifer, Andrei, and Robert W. Vishny. "The Limits of Arbitrage." *The Journal of Finance* 52 (1): 35–55	1997
Sloan, Richard G. "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings?" *The Accounting Review* 71 (3): 289–315	1996
Stambaugh, Robert F. et al. "The short of it: Investor sentiment and anomalies." *Journal of Financial Economics* 104 (2): 288–302	2012
Tetlock, Paul C. "All the News That's Fit to Reprint: Do Investors React to Stale Information?" *The Review of Financial Studies* , 24 (5): 1481–1512	2011

APPENDIX B

Documents Considered[1]
Expert Report of Terrence Hendershott, Ph.D

Title	Date
Earnings Calls	
“Final Transcript: Q3 2014 FXCM Inc Earnings Call,” FXCM Inc.	November 6, 2014
“Final Transcript: Q4 2014 FXCM Inc Earnings Call," FXCM, Inc.	March 12, 2015

Note:
[1] In addition to the documents on this list, I relied upon all documents cited in my report, exhibits, and appendices to form my opinions.

A. Dr. Werner's Event Study Methodology

1. To evaluate *Cammer* Factor No. 5, Dr. Werner conducts an event study. An event study starts with the identification of events to test.[1] Next, the researcher measures the residual return associated with the event. The residual return is calculated as the actual return of the security over the event window minus the expected return over the event window.[2] The expected return is typically calculated by running a regression of the security returns on non-firm specific factors that affect the security returns (*e.g.*, overall market movements, interest rate changes, etc.). Finally, this residual return is compared to a benchmark of "normal" security price movements for the firm to determine if it is statistically significant. If the residual return calculated in this manner is statistically significant, it indicates that the security price movement was likely caused by release of the firm-specific information, rather than random volatility.

2. Dr. Werner's calculation of residual returns is based on "a market model to determine how much of FXCM note's return on each event date was driven by company-specific information as opposed to market or peer group factors."[3] Such a market model assumes a stable linear relation between the security return and the explanatory factors.[4] Also note that Dr. Werner calculates the expected returns by regressing the returns for FXCM Notes on an equity market index–the CRSP NYSE/AMEX/NASDAQ/ARCA Market Index ("Market Index") and a custom stock "industry" index comprised of equity returns for ten companies.[5] Dr. Werner estimates his model over the entire Putative Notes Class Period of June 24, 2014 to February 7, 2017.[6] Given that the Notes did not trade every day, he purportedly only includes days "on which there was a trading price for two consecutive trading days, so that a one-day return could

[1] MacKinlay, Craig. 1997. "Event Studies in Economics and Finance." *Journal of Economic Literature*, 35 (1): 13–39 at p. 14.
[2] MacKinlay, Craig. 1997. "Event Studies in Economics and Finance." *Journal of Economic Literature*, 35 (1): 13–39 at p. 15.
[3] Werner Report, ¶ 141.
[4] MacKinlay, Craig. 1997. "Event Studies in Economics and Finance." *Journal of Economic Literature*, 35 (1): 13–39 at p. 15.
[5] The 10 companies which comprise Dr. Werner's peer index are TD Ameritrade Corporation, The Charles Schwab Corporation, E*Trade Financial Corporation, Gain Capital Holdings, Inc., BGC Partners, Inc., Investment Technology Group, Factset Research Systems, Inc., INTL FCStone, Inc., Interactive Brokers Group, Inc., and MSCI, Inc. *See,* Werner Report, ¶ 74.
[6] Werner Report, ¶ 142.

be computed."[7] Finally, Dr. Werner includes dummy variables for days on which FXCM filed a Form 8-K and for the five trading days between January 16, 2015 and January 23, 2015.[8]

B. Dr. Werner's Treatment of Days Without Bond Trading Is Inconsistent and Makes Unsupported Assumptions

3. In calculating residual returns for the FXCM Note, Dr. Werner states that "[a]ll returns for the FXCM notes were one-day logarithmic returns."[9] Consequently, he considered only days on which the Notes traded for two consecutive trading days, which allows him to calculate one-day returns. Dr. Werner's regression covers the period from June 24, 2014 to February 7, 2017 during which there were 662 trading days. However, given the bond traded infrequently, he has only 66 observations on which a one-day return can be calculated.

4. Despite stressing the importance of using one-day returns in his regression model, when actually calculating the abnormal returns for his two event dates, he does not use a one-day return. In both of these instances, the FXCM Notes did not trade on the trading day immediately prior to the event, requiring Dr. Werner to use a multi-day return where he goes back one or more days to find the previous traded price. For his January 16, 2015 event, Dr. Werner calculates a two-day return using a price from January 14, 2015. For February 7, 2017, Dr. Werner uses a window of 11 days; prior to February 7, the FXCM Notes had not traded since January 26, 2015. Use of an 11-day return hampers Dr. Werner's ability to reliably draw a cause and effect relationship–meaning that the February 6 disclosure, and not other information released during the 11-day window–impacted the bond price. Further, he uses daily volatility to gauge the statistical significance of his 11-day return, which is statistically inappropriate.

5. As a starting point, given that he is using an 11-day return, Dr. Werner has no basis to conclude that this return measures the impact only of the alleged disclosure on February 6, 2017, rather than information that was released prior to this date. For example, the FXCM common stock declined by 5.52% between January 26 and February 6.[10] To the extent the bond price changed after January 26 but before February 6, which in the absence of trading data Dr. Werner

[7] Werner Report, ¶ 142.
[8] Werner Report, ¶ 77.
[9] Werner Report, ¶ 142.
[10] Werner Report, Exhibit 7.

has no basis to conclude, this 11-day return would not be a reliable measure of the price impact for the news on February 6.

6. Further, Dr. Werner's use of a multi-day return has implications for the benchmark to evaluate statistical significance. Put simply, such a benchmark aims to establish "normal" trading volatility, which depends on the length of time over which the returns are measured. A security will move more over one week than one day, so one-day volatility is expected to be lower than one-week volatility.

7. Here, when calculating the t-statistic to determine whether the abnormal returns are significant, Dr. Werner uses the standard errors (a volatility measure) obtained from a regression that uses daily returns and therefore, a measure of daily volatility.[11] Dr. Werner erroneously uses these daily standard errors to calculate the t-statistics for a two-day return on January 16, 2015 and an 11-day return on the disclosure day.[12] Therefore, the t-statistics for multiday returns on January 16, 2015 and the alleged corrective disclosure day have been substantially overestimated.[13]

C. Dr. Werner Is Inconsistent in His Choice of Estimation Window for His Regression

8. Dr. Werner is inconsistent in his choice of estimation window for the FXCM stock versus the Notes. An estimation window is the time period over which the relationship between the security returns and explanatory factors (in this case Dr. Werner's equity market and industry index) is measured. When conducting his stock event study, Dr. Werner divides the Putative Class Period into yearly sub periods, that is, for the event study of FXCM common stock, he uses five different regression estimation periods each consisting of approximately one year of data. He states that he does this "so that the regression estimates would be relatively contemporaneous

[11] The t-statistic is calculated as the one-day abnormal return divided by the standard deviation of the abnormal daily returns in the regression estimation. If the t-statistic has a value of greater than 1.96 or less than 1.96, the abnormal return is deemed statistically significant. This means that there is less than a 5% chance that the particular abnormal return was caused by volatility alone.

[12] A basic statistics concept states that if a random variable is stable and independent, standard deviation over a multi-day interval of *n* days can be calculated by multiplying the daily standard deviation by square root of *n*. *See,* Officer, R.R. 1971. "The Distribution of Stock Returns," *Journal of the American Statistical Association* 67 (340): 807–812. Although doing so may not be appropriate as well since we do not know whether the underlying returns for FXCM Notes are independently distributed and stable.

[13] Werner Report, Exhibit 12.

for events being tested."[14] He further stated at deposition that he did so "based on the fact that there was a structural break in the company's stock."[15] A structural break occurs in this context when either volatility or the relationship between the security return and the explanatory variables changes over time. Indeed, in terms of Dr. Werner's regression results, both the coefficients on the explanatory variables and the volatility, change substantially over his five sub periods.

9. For example, Dr. Werner's regression results differ substantially between the sub period from March 15, 2012 through February 1, 2013 and the sub period from February 6, 2015 through February 5, 2016. The results for the first sub period find the coefficient for the market index as 0.691, the coefficient for the peer index as 0.357, and the standard error as 2.05%.[16,17] This means that in the first sub period, if the market index increased by 1% on a given day, the FXCM stock would be expected to increase by 0.691%. Similarly, if the peer index increased by 1%, the FXCM stock would be expected to increase by 0.357%. The results for the second sub period find the same three variables as 0.023 for the market index, 0.579 for the peer index, and 6.59% for the standard error.[18] When compared across regressions, these result would suggest that the relationship between the market index and FXCM changed substantially between these two periods.

10. In conducting his event study for the FXCM Notes, rather than considering sub periods, Dr. Werner uses data from the entire time period from June 24, 2014 to February 7, 2017 (*i.e.*, more than two and a half years). Dr. Werner fails to explain how this is consistent with his concerns about data being "contemporaneous" or there being a structural break. During the one year prior to the alleged corrective disclosure date, from January 1, 2016 to February 7, 2017, only three dates are included in the regression for FXCM Notes. Therefore, the regression

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[14] Werner Report, ¶ 76.
[15] Werner Deposition, 142:2–6.
[16] Werner Report, Exhibits 8a, 8d.
[17] Stock and Watson (2011) state that "[t]he standard error of the regression measures how far Y [*i.e.*, the dependent variable] typically is from its predicted value." *See*, Stock, James H., and Mark W. Watson. 2011. *Introduction to Econometrics*. 3rd Edition. Addison Wesley Longman, p. 121.
[18] The coefficient can be interpreted as the expected change in the FXCM return given a 1 percent change in the market index or peer index. The coefficient of 0.691 in the first sub period would suggest a 1 percent change in the market would change the FXCM return 0.691%. The result in the second sub period would suggest that same 1 percent change would only change the FXCM return by 0.023%. *See* Werner Report, Exhibit 8d.

estimates in Werner Report Exhibit 11 are almost entirely based on data that was more than one-year-old, and not "relatively contemporaneous."

D. Dr. Werner Does Not Provide a Reliable Basis for Excluding Trading Data from his Event Study

11. As part of his regression model, Dr. Werner includes "dummy variables" to "control for potentially abnormal returns on news events for which the Company filed a Form 8-K with the SEC."[19] Dr. Werner includes dummy variables for ten of the 66 days included in his regression. I am not aware of any peer-reviewed article that supports the view that dummy variables may be used on all dates on which any company news events occur.

12. Importantly, Dr. Werner's use of dummy variables has implications for the statistical properties of his event study. In particular, as discussed above one purpose of an event study is to estimate "normal" volatility to determine if a price movement is sufficiently large such that it is unlikely have to occurred by chance (*i.e.*, being statistically significant). The inclusion of a dummy variable for a specific date in a regression model allows the model to perfectly predict the return on that date. If the date is perfectly predicted, then the return on that date is effectively removed from the estimate of the "normal" volatility during the estimation window. By including dummy variables on all the days with potential news flow, his event study will estimate "normal" volatility based on days without any potential news, and thereby understate the volatility (i.e. standard error) estimated in the regression model and inflate the statistical significance of the abnormal returns.

E. Dr. Werner's Choice of Explanatory Factors for the FXCM Notes Is Flawed

13. A security price can move due to firm specific news or due to general market or industry news about the economy, interest rates, or other non-firm specific factors. An event study isolates only the firm specific component of price movements by using explanatory factors to control for the non-firm specific factors. Here, Dr. Werner uses an equity market index and an equity "peer" index to isolate FXCM specific returns.[20]

[19] Werner Report, ¶ 77.
[20] Werner Report, ¶¶ 70–74, 140.

14. Dr. Werner's choice of an equity market and peer index as the explanatory factors for the FXCM Notes returns is not supported by the academic literature. Dr. Werner stresses this differences in his own report when he states that the "bond market can differ drastically from the stock market"[21] and that "a company's bonds will not always react to company information in the same manner as its common stock."[22] Despite this, Dr. Werner does not include any bond market related factors in his regression. He also fails to cite a single peer reviewed academic paper that advocates using these two factors to explain returns for bonds.

15. One academic study by Bessembinder et al. (2009) examines the methodologies used by 20 other academic studies to explain bond returns in the peer reviewed literature. Not a single one of the 20 studies supports the use of the two factor model used by Dr. Werner in his report.[23,24] Bessembinder et al. (2009) also note that a mis-specified model, such as Dr. Werner's, increases the possibility of erroneous conclusions regarding existence of abnormal returns.

16. In fact, to understand why Dr. Werner's model is ill-specified, one can see that the coefficients on both of the explanatory factors that he has controlled for, the equity market index and peer index, are statistically *insignificant*. The lack of statistical significance for the coefficients of these variables means that Dr. Werner cannot conclude that the coefficients are different from zero and therefore cannot claim that these variables contribute meaningful information to predict the returns of the FXCM Notes.[25]

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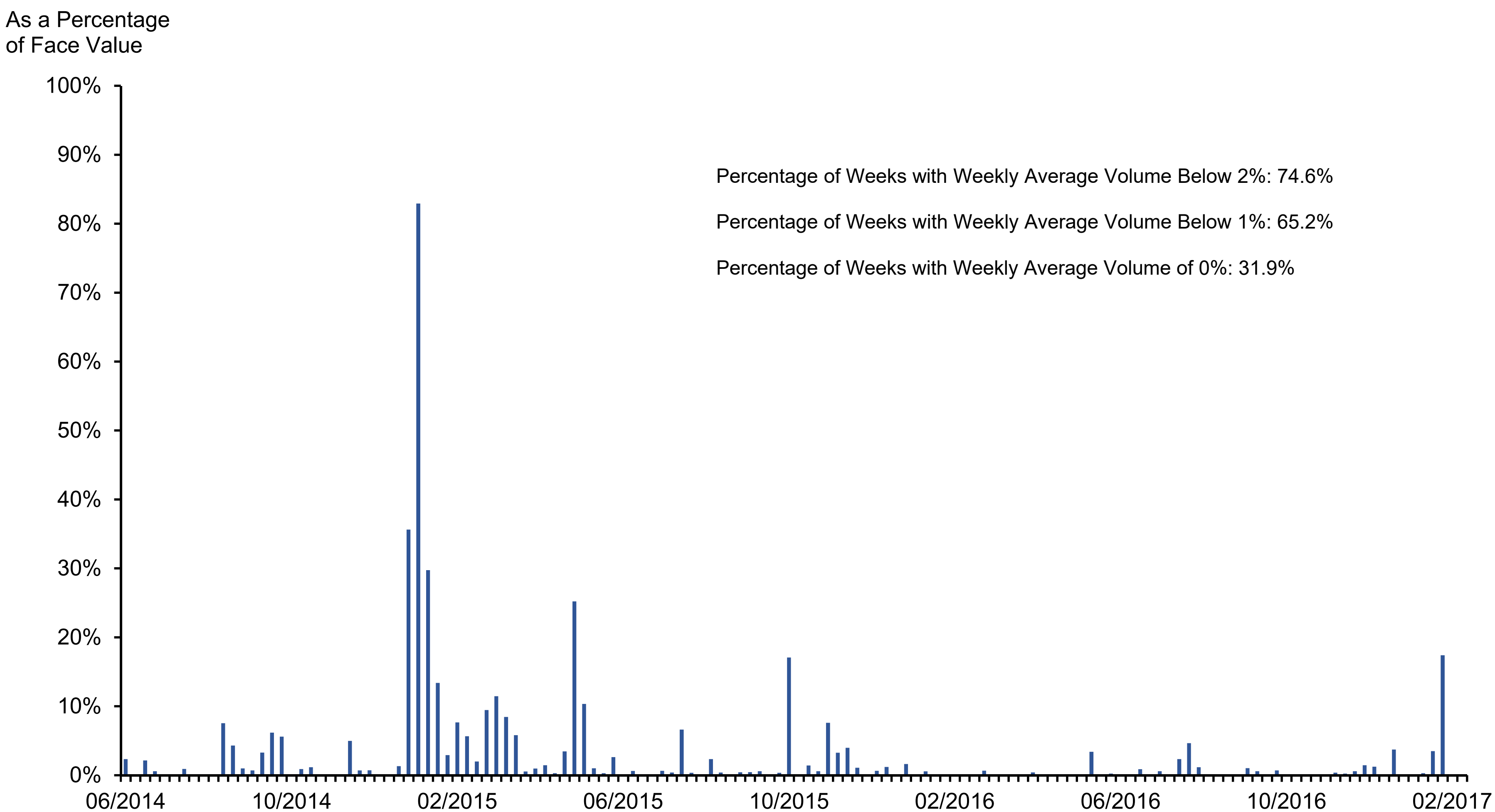
[21] Werner Report, ¶ 120.
[22] Werner Report, ¶ 121.
[23] Bessembinder, Hendrik et al. 2009. "Measuring Abnormal Bond Performance," *Review of Financial Studies* 22 (10): 4219–4258.
[24] The two factor models considered by Bessembinder et al. (2009) are the ones developed by Fama and French (1993) and Elton et al. (1995). The former of the two consists of market factor (similar to one used by Dr. Werner), a size factor (difference in returns on stocks of small vs. large firms), a book-to-market factor (difference in returns on stocks of firms with low book-to-market ratio and high book-to-market ratio), a default premium factor (measured as the difference between the returns on long-term corporate bond indices and long-term U.S. Treasuries) and a Term Spread factor (measured as the slope of the Treasury yield curve). The factor model used by Elton et al. (1995) consists of GDP factor (unexpected change in gross domestic product), CPI factor (unexpected change in the consumer price index), DRP factor (same as default risk premium in Fama and French 1993), Return on the Lehman Corporate Bond Index, a market factor, and Term Spread factor (same as Term Spread Factor in Fama and French 1993). *See,* Fama, Eugene F. and Kenneth R. French. 1993. "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33 (1): 3–56. *See also,* Elton, Edwin at al. 1995. "Fundamental Economic Variables, Expected Returns, and Bond Fund Performance," *The Journal of Finance* 50 (4): 1229–1256.
[25] Werner Report, Exhibit 11.

EXHIBIT 1

FXCM Notes Weekly Average Volume

6/24/2017 – 2/6/2017



Source: Corrected Expert Report of Dr. Adam Werner, Exhibit 3b

EXHIBIT 2

FXCM Notes Trading Volume Statistics

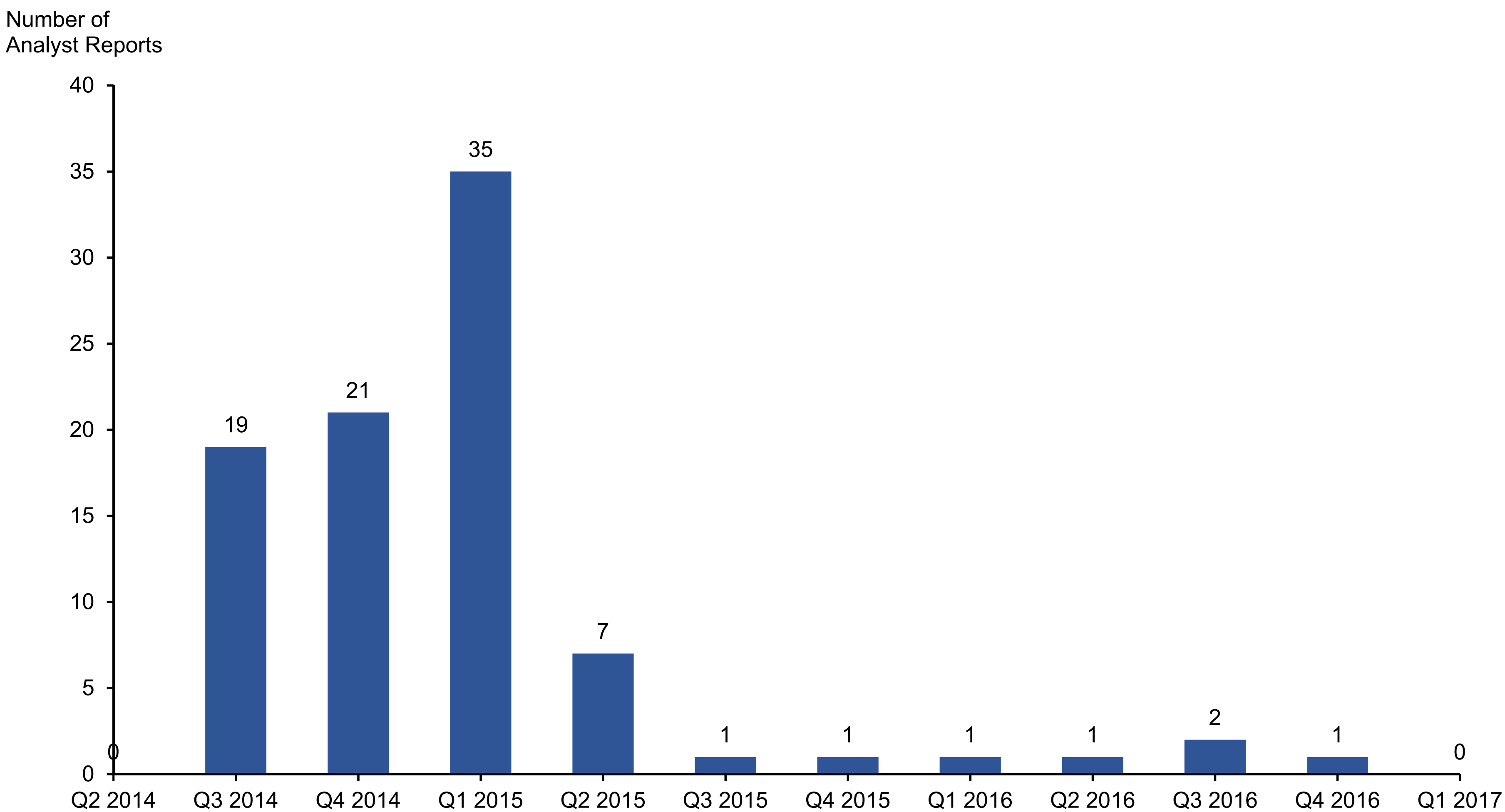
Statistic	Putative Notes Class Period 6/24/2014 – 2/6/2017	Second Half of the Putative Notes Class Period 10/17/2015 – 2/6/2017	Putative Notes Class Period during 2016 and 2017 1/1/2016 – 2/6/2017
Average Weekly Notional Volume Traded as a Percentage of Face Value[1]	2.92%	0.98%	0.82%
Median Weekly Notional Volume Traded as a Percentage of Face Value[1]	0.49%	0.01%	0.01%
Number of Weeks with Average Notional Volume Traded as a Percentage of Face Value Over 2%[1]	35/138	9/69	6/58
Number of Weeks with Average Notional Volume Traded as a Percentage of Face Value Under 2%[1]	103/138	60/69	52/58
Number of Weeks with Average Notional Volume Traded as a Percentage of Face Value Over 1%[1]	48/138	17/69	11/58
Number of Weeks with Average Notional Volume Traded as a Percentage of Face Value Under 1%[1]	90/138	52/69	47/58
Number of Days With Notes Trading	174	56	36
Number of Days With Notes Trading as a Percentage of All Potential Trading Days	26.32%	17.07%	13.04%

Source: Corrected Expert Report of Dr. Adam Werner, Exhibit 3b, Exh bit 7; Backup to the Corrected Expert Report of Dr. Adam Werner

Notes:
[1] Average and Median Weekly Notional Volume Traded as a Percentage of Face Value are calculated using the weekly volumes presented in the Corrected Expert Report of Dr. Adam Werner, Exhibit 3b.

EXHIBIT 3

FXCM, Inc. Quarterly Analyst Reports Issued
Q2 2014 – Q1 2017



Source: Corrected Expert Report of Dr. Adam Werner, Exhibit 4

Note: Q2 2014 begins on June 24, 2014, the beginning of the Putative Notes Class Period. Q1 2017 ends on February 6, 2017, the end of the Putative Notes Class Period.

EXHIBIT 4

Dr. Werner's "News No News" Test Applied to the FXCM Notes

	Category	"News" Days[1]	"Non-News" Days	Fisher Exact Test P-value
[A]	Trading Days during Putative Note Class Period	64	597	
[B]	Trading Days with FXCM Notes Return[2]	8	60	
[C]	Trading Days with Statistically Significant FXCM Notes Return[3]	2	8	
[C / A]	Trading Days with Statistically Significant FXCM Notes Return as a Proportion of Trading Days during Putative Note Class Period[4]	3.1%	1.3%	0.2512
[C / B]	Trading Days with Statistically Significant FXCM Notes Return as a Proportion of Trading Days with FXCM Notes Return[5]	25.0%	13.3%	0.3339

Source: Corrected Expert Report of Dr. Adam Werner, Exhibit 7, Exhibit 10, Exhibit 12

Notes:
[1] "News" days are defined as the "Effective Trading Date" for the 8-K events presented in the Corrected Expert Report of Dr. Adam Werner, Exhibit 10.
[2] Daily FXCM Notes Returns are calculated only for trading days with consecutive bond trading in order to be consistent with Dr. Werner's Note event study methodology.
[3] Statistical significance is based on the results of Dr. Werner's notes regression as presented in the Corrected Expert Report of Dr. Adam Werner, Exhibit 12.
[4] Calculated as the number of trading days with statistically significant returns divided by the number of trading days during the Putative Note Class Period.
[5] Calculated as the number of trading days with statistically significant returns divided by the number of trading days with FXCM Note returns.

EXHIBIT 5

Dr. Werner Event Study Residual Returns on 8-K Days
6/24/2014 – 2/6/2017

	FXCM Common Stock			FXCM Notes		
Effective Trading Date[1]	Adjusted Closing Price[2]	Residual Return[3]	Statistical Significance[3][4]	Volume Weighted Average Price[5]	Residual Return[6]	Statistical Significance[4][6]
7/16/2014	$132.80	-0.45%		$98.31		
8/8/2014	$128.40	-2.09%		$96.87		
9/10/2014	$153.00	2.93%		$103.36		
9/22/2014	$163.60	-0.98%		$106.00		
10/17/2014	$168.70	-0.43%				
11/7/2014	$158.10	-4.67%	*			
12/10/2014	$162.10	-2.99%		$105.79	-0.45%	
1/14/2015	$148.70	-10.46%	*	$99.81		
1/16/2015				$55.56	-58.47%	*
1/20/2015	$16.00	-207.28%	*	$46.91	-16.91%	*
1/26/2015	$24.40	2.66%		$65.19	2.61%	
1/30/2015	$22.00	-1.05%		$71.75	0.39%	
2/2/2015	$21.20	-4.55%	*			
2/12/2015	$22.20	-1.38%				
3/13/2015	$25.80	19.19%	*	$75.16		
3/17/2015	$24.50	-0.45%		$75.75	0.78%	
3/25/2015	$21.00	2.70%		$77.07	2.22%	
4/7/2015	$21.90	2.49%				
4/15/2015	$21.70	0.12%				
4/21/2015	$21.10	0.16%				
5/11/2015	$19.60	-10.02%		$83.88	-0.64%	
5/22/2015	$12.20	-6.74%				
5/28/2015	$14.30	-5.25%				
6/10/2015	$15.90	-0.31%		$84.51		
6/15/2015	$15.10	-0.01%				
7/15/2015	$13.50	-1.92%				
8/7/2015	$9.60	-6.55%		$80.00		
9/10/2015	$9.37	5.08%		$75.00		
9/14/2015	$8.55	-3.71%				

EXHIBIT 5

Dr. Werner Event Study Residual Returns on 8-K Days

6/24/2014 – 2/6/2017

	FXCM Common Stock			FXCM Notes		
Effective Trading Date[1]	**Adjusted Closing Price[2]**	**Residual Return[3]**	**Statistical Significance[3][4]**	**Volume Weighted Average Price[5]**	**Residual Return[6]**	**Statistical Significance[4][6]**
9/17/2015	$8.42	2.35%				
9/21/2015	$8.48	-7.30%				
9/23/2015	$8.33	0.34%				
9/30/2015	$8.70	0.84%				
10/1/2015	$8.01	-7.98%				
10/8/2015	$9.28	-3.54%				
10/14/2015	$10.02	7.26%		$67.95		
11/6/2015	$8.95	-2.95%		$67.50		
12/14/2015[7]	$8.08	41.95%	*	$63.00		
12/15/2015	$6.76	-18.98%	*			
1/13/2016	$14.15	-15.04%	*			
1/27/2016	$11.98	9.03%				
2/2/2016	$10.71	-4.35%				
2/10/2016	$9.96	0.07%				
3/11/2016	$11.10	-30.93%	*			
4/12/2016	$10.95	-3.17%				
4/18/2016	$11.28	1.19%				
5/6/2016	$11.04	1.23%				
6/9/2016	$8.90	-8.47%	*			
6/14/2016	$8.10	1.00%				
7/12/2016	$9.19	-3.01%				
8/4/2016	$10.12	6.50%	*	$40.25		
9/1/2016	$9.25	-0.30%				
9/9/2016	$9.18	1.31%		$39.15		
9/13/2016	$9.25	3.71%				
9/30/2016	$8.77	0.19%				
10/4/2016	$8.18	4.64%				
10/5/2016	$8.40	1.46%				
10/11/2016	$8.14	1.09%				

EXHIBIT 5

Dr. Werner Event Study Residual Returns on 8-K Days
6/24/2014 – 2/6/2017

	FXCM Common Stock			FXCM Notes		
Effective Trading Date[1]	Adjusted Closing Price[2]	Residual Return[3]	Statistical Significance[3][4]	Volume Weighted Average Price[5]	Residual Return[6]	Statistical Significance[4][6]
10/31/2016	$7.80	-2.92%				
11/8/2016	$7.75	-1.69%				
11/10/2016	$7.85	1.94%				
11/18/2016	$7.80	-2.44%				
12/14/2016	$8.15	-3.82%				
1/12/2017	$7.35	1.38%				

8-K Days with FXCM Notes Trading	**22**
8-K Days without FXCM Notes Trading	**42**

Source: Corrected Expert Report of Dr. Adam Werner, Exhibit 7, Exhibit 9, Exhibit 10, Exhibit 12; Backup to the Corrected Expert Report of Dr. Adam Werner
Notes:
[1] Effective Trading Date is the set of dates identified in the Corrected Expert Report of Dr. Adam Werner, Exhibit 10.
[2] FXCM Common Stock Adjusted Price is adjusted for the October 1, 2015 reverse stock split.
[3] The Residual Return and Statistical Significance for the FXCM Common Stock are the results from Dr. Werner's event study as presented in the Corrected Expert Report of Dr. Adam Werner, Exhibit 7.
[4] Residual Returns marked with a "*" are statistically significant at the 95% confidence level in Dr. Werner's event study analysis.
[5] The Volume Weighted Average Price ("VWAP") represents the volume weighted average price of all trades for the FXCM Notes on each Effective Trading Date.
[6] The Residual Return and Statistical Significance for the FXCM Notes are the results from Dr. Werner's event study as presented in the Corrected Expert Report of Dr. Adam Werner, Exhibit 9.
[7] The VWAP price on 12/14/2015 is comprised of the two trades that occured after market on 12/11/2015. As 12/11/2015 is a Friday, the effective trading date for those trades would be the following Monday, 12/14/2015.